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Water quality, flows and fish numbers—Looking for correlations in the Shasta River.

Concern for water quality (especially temperatures) is focused primarily around meeting the needs of coho and chinook salmon and also steelhead. The recent listing of coho, and the near listing of steelhead, along with the pending development of an attainment plan for the Shasta to meet the mandates of the Clean Water Act (establishment of TMDLs) have all sharpened the focus on water quality, and necessitated a review of the present conditions and trends in the Shasta River. How well we are doing in these areas will have significant effects on land and water uses in the Shasta Valley in the future.

Ideally, we would be looking at conditions in a way that is specific for the main species of concern—coho and steelhead. Unfortunately, while both coho and steelhead are present in the Shasta, their timing, currently low numbers, and lack of reliable data effectively prevent us from using them as an index of success. The best we have available is the information on fall chinook.

There are several important differences in the life histories of chinook, coho and steelhead. Chinook mostly leave the Shasta River for the ocean in the spring and early summer. Very few remain in the Shasta through the summer before leaving. Coho, on the other hand, must spend at least their first year in fresh water, and apparently don't leave the Shasta until they are about a year old. That means that they must have suitable conditions through one entire summer in order to survive.

Steelhead have even more difficult requirements to meet. They may stay in the Shasta for two or more years before leaving for the ocean, making the necessity of good water quality all summer even more important. Steelhead leave the Shasta in the late spring and early summer. They formed the foundation of a commercial fishery in the Shasta in the 1860's, and also made the Shasta the most heavily sport-fished stream in Siskiyou County in the 1950's and 1960's.

Data available:

The US Geological Survey has been collecting river flow data near the mouth of the Shasta since 1934. Before that they collected flow data intermittently from 1912-1933 where the Montague-Grenada Road crosses the Shasta. They also collected maximum and minimum temperatures between 1965 and 1979 near the mouth of the Shasta, and flow data near Edgewood above Dwinnell Dam from 1963-67. DWR has been operating gaging stations at both the Montague-Grenada Rd., and near Edgewood since they were abandoned by USGS.

The California Department of Fish and Game (DFG), Shasta CRMP (CRMP), California Department of Water Resources (DWR), and North Coast Regional Water Quality Control Board (RWQCB) have collected extensive sets of temperature data, some of it in the form of grab samples, and some in continuous form collected over many months. Their records span the period from the 1950's through the present, although continuous data was only being collected starting in the mid-1990's.

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Other water quality testing, including nutrients, dissolved oxygen, and minerals has been done intermittently in the form of grab samples, mostly by DWR and RWQCB, from the 1950's through the present.

The DFG has been counting spawning fall chinook salmon in the Shasta since 1930, and also counted the steelhead and coho who came through while the fall chinook were being counted. They did some trapping and counting of outmigrating juvenile chinook in the 1960's to establish outmigration timing, trapped and tagged outmigrating juvenile chinook salmon in the late 1980's, but only began systematically counting outmigrants in an effort to estimate total outmigrant numbers in 2000.

Temperature trends in the Shasta

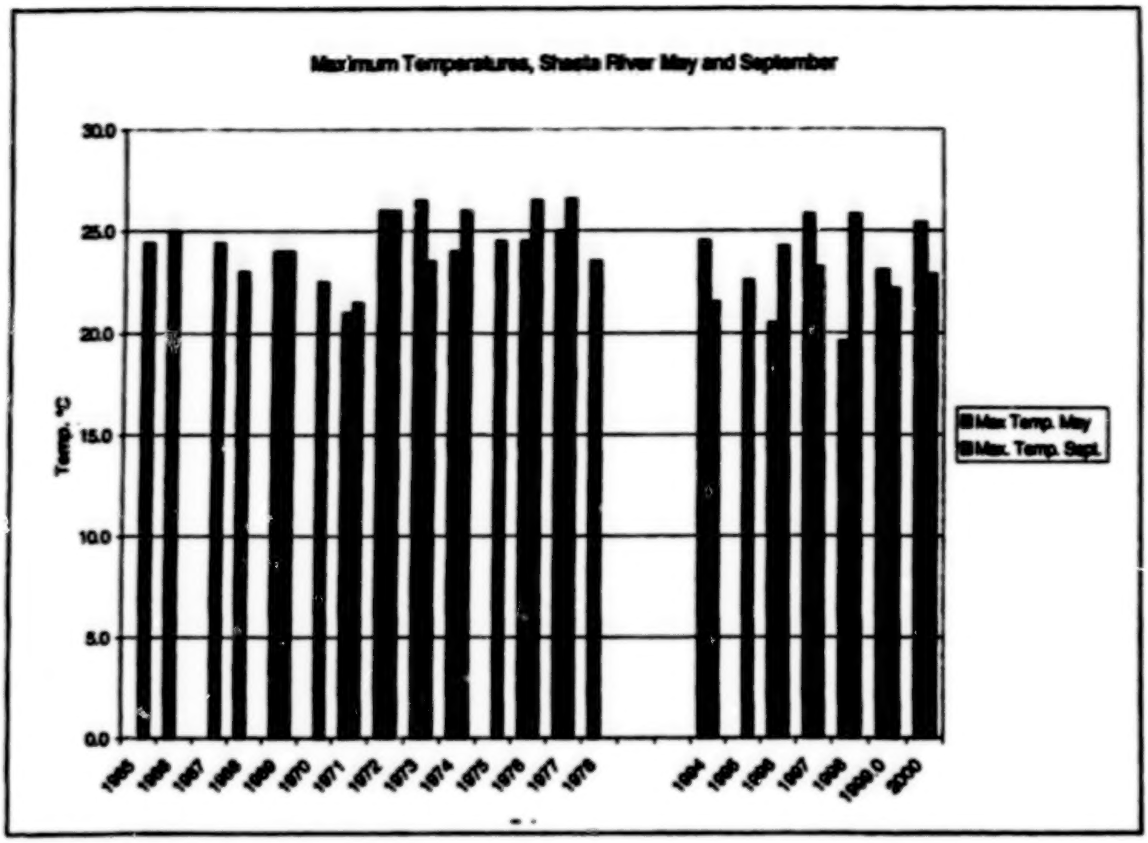
At the present time, river temperature information is being gathered at well over a dozen sites throughout the Shasta Valley (see attachment 1). Utilizing funding from this grant, all of the recent (1994-present) temperature data has been assembled into annual data sets for possible analysis. Prior to 1994, the only data that was being collected on a continuous basis over any time period was from the mouth of the Shasta (collected by USGS). That data, along with an array of single instance grab samples was also entered into electronic form for possible future use as part of this effort. To look at trends over time, the only site where we can make useful comparisons is at the mouth of the Shasta where data spanning many years is available.

The USGS data spans 14 years (1965-78). Recent continuous data covers 7 years. In order to make meaningful comparisons that could be readily followed and understood, the data examined needed to be somehow limited. I chose to use the months of May and September (see attachments 2 and 3) as indicators of change over time when conditions were at or near critical.

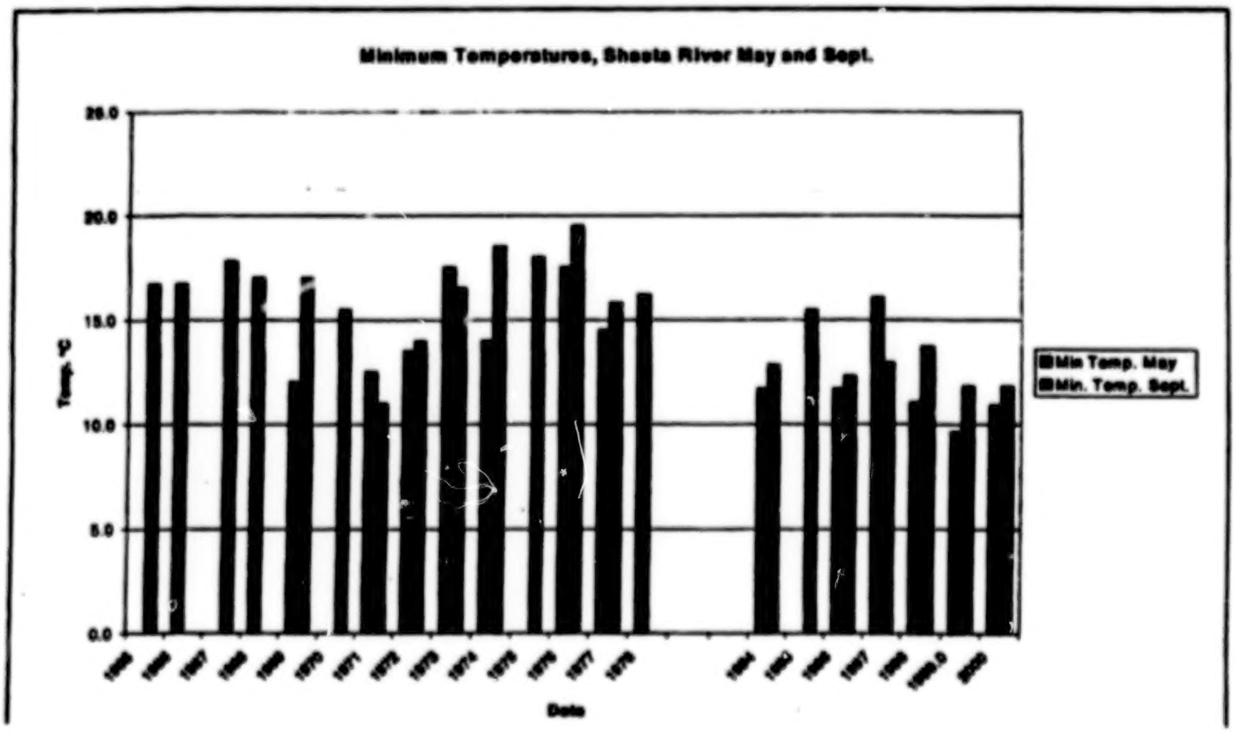
Water temperatures in May can approach lethal, affecting both outmigrating and oversummering juveniles. By June, water temperatures at the mouth have generally begun to reach lethal temperatures intermittently. May seemed like a good index month, in which any change since the 1960's would be both apparent and significant.

September is also a critical month, primarily for returning fall chinook. High water temperatures can limit entry into the Shasta, reduce egg survival, limit spawner dispersal, and increase inriver mortality. It is a month when the purchase of water for increased instream flows could be beneficial to at least fall chinook. By October, night temperatures are dropping, and river flows have increased with the end of the irrigation season. September also seems like a month when changes over time would be both apparent and significant.

USGS data is limited to maximum and minimum daily temperatures. More recent data can be compared on those two parameters for indications of trends over the last 35 years, a time period when fall chinook coho and steelhead numbers plummeted. The data from 1994 to the present corresponds to a time when substantial work has been started to improve water temperatures, although insufficient time has elapsed to expect much change to be apparent.



Visually, there appears to be a break in the USGS temperature values occurring between 1971 and 1972. What, if anything beyond normal weather patterns this represents is unclear. The temperatures from 1994 to the present seem to be similar to the values from 1965-78. It should be noted that the data sets for May 70, May 75, Sept 95, May 96, and May 98 cover substantially less than full months (see attachment 4).



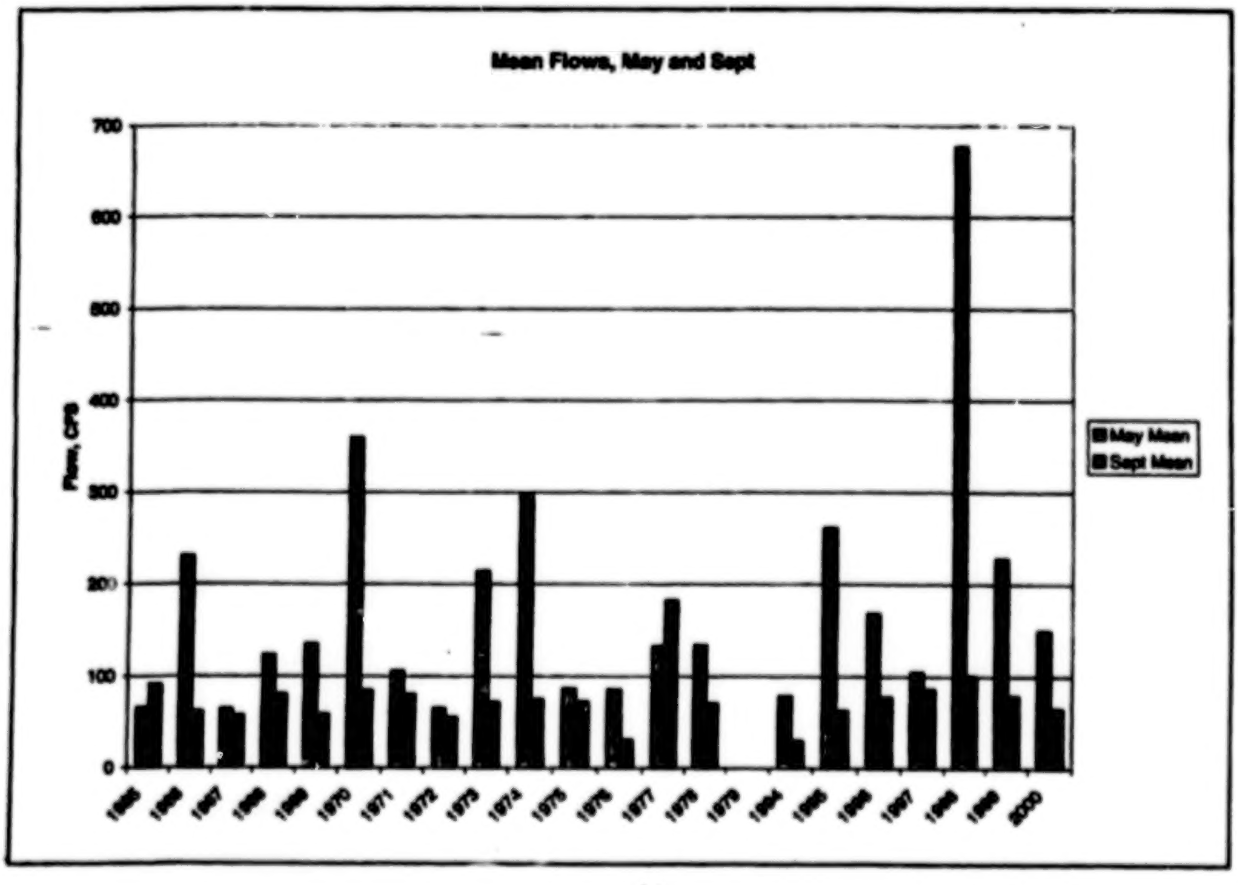
Minimum temperature values show a definite trend towards cooler temperatures. Why this would be is not clear. The above mentioned data limitations limit interpretations. Possible explanations include:

1. Changes in vegetation in the canyon—possibly increased tree heights reduce heat radiated from canyon walls, but still allow the river to radiate heat to the sky at night while the river reaches equilibrium during the day during the entire period of record (hence no change in maximum temps).
2. Reduced stream flows, allowing greater cooling at night, while the river reaches equilibrium during the day during the entire period of record (hence no change in maximum temps.)
3. Decreased shading on the Shasta River in the open areas of the Shasta Valley, allowing greater radiation of heat at night, while the river reaches equilibrium during the day during the entire period of record (hence no change in maximum temps.)
4. Climatic change resulting in cooler, windier or clearer nights, allowing greater heat loss.

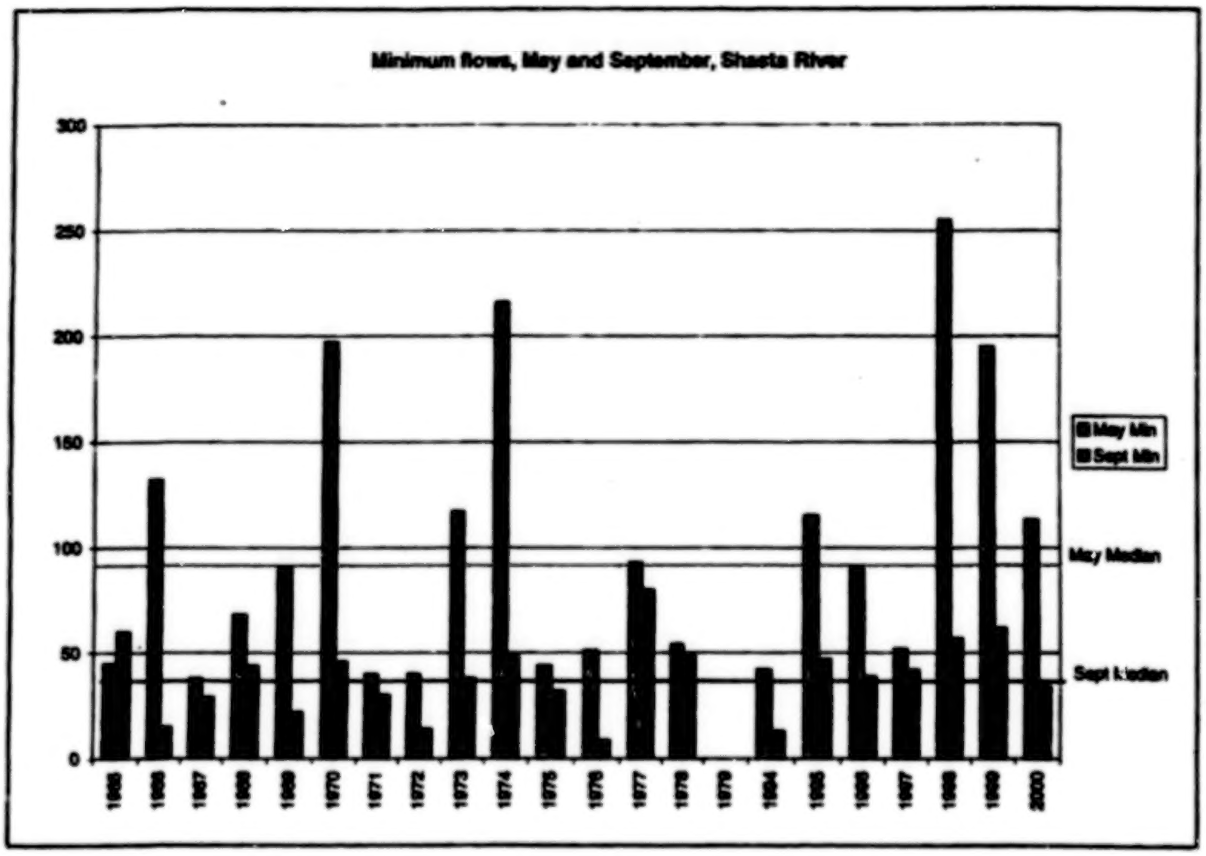
The absence of long-term upstream data, average temperature data from the 60's and 70's, or data over a longer period of time makes any conclusions speculative. Data on air temperatures would also be helpful, and could be researched.

Flow Data

Flow data for the months studied is complete (see attachment 5). Most noteworthy is the extremely high flows observed in May of 1998 (highest on record). Other than that, mean monthly flows have tended to be in the normal range, with their average apparently somewhat higher than normal. September in particular shows the effect of the long series of wet years with good snowpack beginning about 1995.

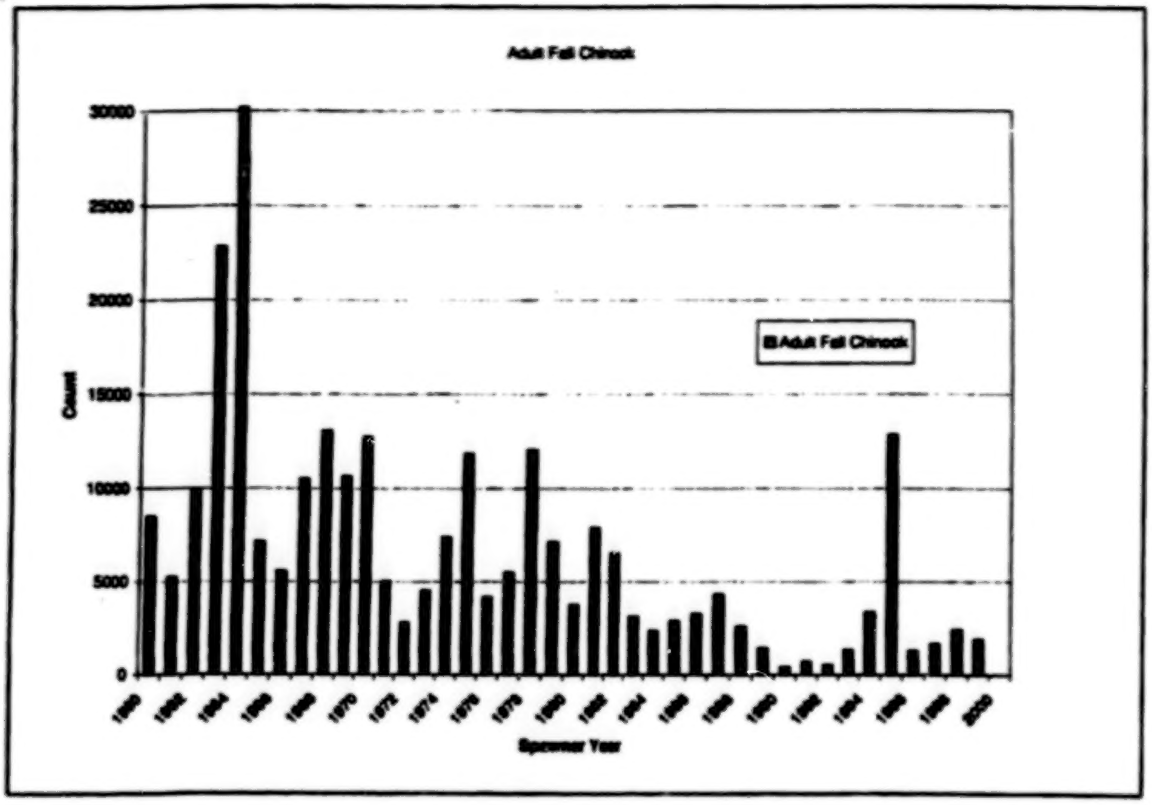


Minimum flows for the months studied show more strongly that the range of minimum September flows since 1994 have tended to be above the values found between 1965 and 1978. This is consistent with the shift in weather towards wetter years, and also may indicate greater attention to maintaining instream flows by water managers. Conclusions for May are similar.



Fall Chinook spawner numbers

Spawner counts for this period are also complete (see attachment 6). Unfortunately, fall chinook return to spawn at ages 2,3,4,and 5 years, and for most of the period of record, the only distinctions made were between 2 year olds, and adults. This makes it difficult to examine water conditions for either the parent years in a given spawner run, or the progeny of that run when they return. This difficulty is further compounded by changes in fishing that have occurred during this time. Harvest impacts take an unknown percentage of each year class of Shasta salmon, and harvest has shifted from primarily occurring in the ocean, to the current situation where it is intended to be split equally between the ocean and that which occurs in the Klamath River. In-river harvest in particular has the potential to impact early running fish, like those returning to the Shasta. Finally, conditions in the Klamath and in the ocean can vary greatly from year to year, further confounding an evaluation of the effects of water quality within the Shasta itself.



Given all of the above limitations, still the bulk of the adult salmon return at ages 3 and 4. Spawner numbers could be compared to water conditions in the fall 3 and 4 years prior to the date they return to spawn to look for water quality impacts on the parent run, and three and four years later to look at water quality impacts at the time of spawning may have been on the progeny as they return as adults. Finally, water quality the year after spawning would affect the survival of the juvenile fish as they outmigrate to the sea, and so could be compared to spawner returns 2 ½ and 3 ½ years later[1].

It also needs to be noted, that high winter flows (while salmon eggs are in the river gravel, or the salmon have just emerged (roughly October through February for fall chinook) can have much more profound impacts on overall survival, and that those impacts will not be discernable from summer water quantity and quality data.

Given these multiple overlapping variables, most of which cannot be well described with available data, there seems to be little point in attempting to analyze each of them at this point.

Conclusions

Water temperatures, spawner returns and mean daily flow data are all fairly robust data sets, although water temperature data for a longer time frame would have been extremely helpful, as would historic data from further upstream in the Shasta. Both water temperatures and flows seem to show a slight improving trend as far as fish are concerned. What this is a result of is not clear at this time. Possibilities include improvements in riparian habitat, higher than normal precipitation, climatic shift, or changes in water management. Whatever the case, the fact that conditions have not gotten worse should be viewed as significant, since this was a time period when irrigation related equipment and infrastructure[2] has improved, population has risen, and one would expect that demands on resources, including water, would have gotten greater.

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[1] Calendar year 2000 is the last period for which any spawner information is available. Age analysis was not systematically initiated until the 1980's. Those salmon that returned at age four in 2000 came from eggs laid in 1996, and they almost certainly outmigrated in the spring and summer of 1997. Hence, the only period for which reasonably complete information could be available is the period from 1994 (when recent water quality data collection began) and the spring and early summer of 1997, when the bulk of the outmigration would have been complete, much too short period in which to try to weigh all the competing climatological, water quality, ocean condition, and harvest factors that are operating simultaneously.

Realistically, there are far too many other variables to allow accurately assessing the water quality impacts on recent fish numbers with the limited duration data currently available on flow, temperature or spawner numbers. Efforts to present assumptions based on these factors should continue to be questioned closely until either a better accounting is possible of all life stage impacts on fish survival, or outmigrant numbers data can be used to eliminate out-of-basin impacts. At the same time, the fact that there is apparently no correlation that is so strong that it overrides all other factors cannot be taken as proof that there are no water quality related impacts that could be reduced. It continues to appear that no single factor can be responsible for fish declines, and no single remedial action will restore their numbers.

Recommendations:

The continued gathering of outmigrant data is critical to our ever having the opportunity of evaluating fisheries restoration progress in the Shasta, and needs to be continued indefinitely. The development of a total outmigrant estimate should continue to be a goal of the program. Likewise, temperature data can and should continue be gathered at key locations along the river. Other water quality parameters than temperature need to be looked at to eliminate them as possible mortality factors.

Given the apparent absence of a strong correlation between fish numbers and changes in conditions in the Shasta (at least in the limited data examined here)[3], increased emphasis should be placed on investigations outside the Shasta Basin to better understand the sources of the variability in fish numbers observed. Fuller understanding of all the sources of variability is needed to develop the most effective mechanisms to increase fish numbers.

While current conditions in the Shasta are apparently long-standing in nature, opportunities for improvement should be aggressively pursued in order to assure that bottlenecks are not developing or occurring within the watershed.

Additional data may or does exist that could help to clarify trends, including long term climatic data for the Yreka area (1878-present), and temperature data collected by DFG counting weir operators during the 1950's[4], and possibly earlier.

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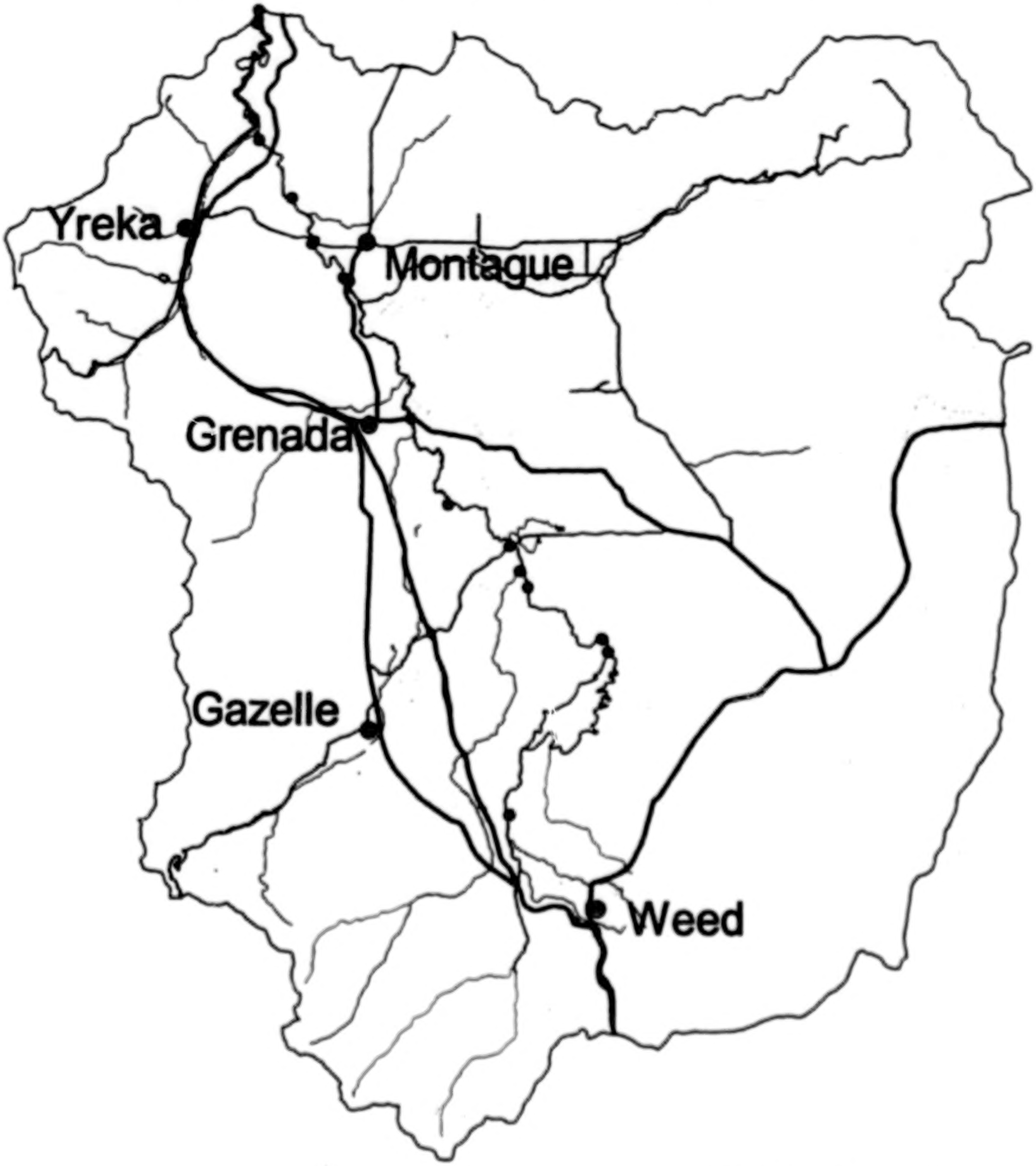
[2] Including the widespread ownership of backhoes and dump trucks, and the availability of relatively lower cost plastic pipes and culverts.

[3] Full electronic temperature datasets were submitted with this report to allow others to perform more extensive analysis.

[4] Administrative reports by Coots beginning about 1950 mention water temperatures without providing the data. Efforts to find that data have been unsuccessful to date.

Attachment 1

Primary Temperature Monitoring Locations in Shasta River Watershed



Daily Temperature Values
Mouth of Shasta, 1994-2000

Attachment 2

Mouth of Shasta, May and September Data															
		Celsius				Celsius				Celsius				Celsius	
Date	Maximum	Minimum	Mean	Date	Maximum	Minimum	Mean	Date	Maximum	Minimum	Mean	Date	Maximum	Minimum	Mean
05/01/1994	16.2	11.98	14.45333					09/01/1995	22.27	16.91	19.4965	09/01/1996	24.23	18.12	21.05667
05/02/1994	17.81	11.68	14.76267					09/02/1995	21.61	16.26	18.9805	09/02/1996	24.23	18.12	20.93771
05/03/1994	16.53	13.76	15.31667					09/03/1995	20.45	15.46	18.108	09/03/1996	23.03	17.63	20.34688
05/04/1994	15.89	13.76	14.986					09/04/1995	20.78	15.63	18.101	09/04/1996	21.04	16.68	18.69906
05/05/1994	17.18	13.15	15.27533					09/05/1995	21.1	15.46	18.3025	09/05/1996	20.22	14.78	17.46719
05/06/1994	17.18	14.65	15.83533					09/06/1995	21.44	15.94	18.769	09/06/1996	20.54	14.16	17.29844
05/07/1994	19.13	14.35	16.57467	09/07/1994	21.54	18.8	20.43909	09/07/1995	21.29	16.4	18.817	09/07/1996	21.04	14.63	17.92365
05/08/1994	21.21	15.89	18.352	09/08/1994	21.21	16.82	18.9495	09/08/1995	21.1	15.94	18.5955	09/08/1996	22.2	16.05	19.12677
05/09/1994	22.62	17.48	19.87133	09/09/1994	18.8	15.57	17.3625	09/09/1995	21.44	16.26	18.9025	09/09/1996	23.2	16.84	20.02635
05/10/1994	23.72	17.81	20.614	09/10/1994	18.15	14.96	16.5475	09/10/1995	21.94	16.71	19.293	09/10/1996	23.37	17.32	20.23823
05/11/1994	23.35	18.47	20.82733	09/11/1994	17.18	14.96	15.863	09/11/1995	22.27	16.91	19.59	09/11/1996	20.87	16.68	18.80979
05/12/1994	22.27	17.18	19.77467	09/12/1994	17.48	13.15	15.4275	09/12/1995	22.59	17.04	19.8435	09/12/1996	18.76	15.89	17.355
05/13/1994	21.54	15.89	18.722	09/13/1994	17.81	12.85	15.4775	09/13/1995	21.44	17.35	19.05309	09/13/1996	17.16	15.42	16.44604
05/14/1994	20.5	16.2	18.11467	09/14/1994	18.15	13.46	15.905	09/14/1995				09/14/1996	17.63	14.16	15.81177
05/15/1994	17.81	14.35	16.194	09/15/1994	18.8	14.04	16.631	09/15/1995				09/15/1996	18.12	15.89	16.62229
05/16/1994	16.82	13.46	14.91	09/16/1994	19.79	14.35	17.081	09/16/1995				09/16/1996	16.61	14.47	15.57854
05/17/1994	16.82	11.98	14.13333	09/17/1994	19.13	14.96	17.281	09/17/1995				09/17/1996	16.21	13.69	14.80583
05/18/1994	17.18	12.28	14.868	09/18/1994	20.15	14.96	17.626	09/18/1995				09/18/1996	16.84	12.3	14.53854
05/19/1994	17.81	13.76	15.65667	09/19/1994	20.5	15.57	17.9645	09/19/1995				09/19/1996	18.6	14.47	16.2726
05/20/1994	18.47	14.04	16.21067	09/20/1994	20.15	16.2	18.1225	09/20/1995				09/20/1996	18.6	14.31	16.51271
05/21/1994	17.18	14.96	16.208	09/21/1994	20.5	16.2	18.2235	09/21/1995				09/21/1996	18.93	15.26	16.88052
05/22/1994	20.15	13.46	16.544	09/22/1994	20.15	16.53	18.1315	09/22/1995				09/22/1996	17	13.23	15.07583
05/23/1994	21.9	15.57	18.612	09/23/1994	19.46	15.89	17.8945	09/23/1995				09/23/1996	16.68	12.3	14.35927
05/24/1994	24.13	17.48	20.58333	09/24/1994	18.8	15.89	17.59	09/24/1995				09/24/1996	17.16	12.61	14.8[illegible]01
05/25/1994	24.51	19.13	21.63067	09/25/1994	19.46	16.2	18.1685	09/25/1995				09/25/1996	17.32	13.23	15.11125
05/26/1994	21.21	18.8	20.11733	09/26/1994	20.15	15.89	18.0745	09/26/1995				09/26/1996	17.47	13.54	15.40229
05/27/1994	21.9	16.2	18.95267	09/27/1994	18.8	15.89	17.7555	09/27/1995				09/27/1996	18.26	13.69	15.84448
05/28/1994	21.54	16.53	18.94333	09/28/1994	18.8	16.82	17.829	09/28/1995				09/28/1996	18.6	14	16.12708
05/29/1994	21.54	16.53	18.988	09/29/1994	17.48	15.57	16.683	09/29/1995				09/29/1996	18.93	14.47	16.61167
05/30/1994	23.01	15.89	18.43467	09/30/1994	17.18	14.35	16.0645	09/30/1995				09/30/1996	18.44	15.42	16.73823
05/31/1994	22.27	19.13	20.48333												
Mean			17.8				17.4				18.9				17.1
Min		11.68				12.85				15.46				12.3	
Max	24.51				21.54				22.59				24.23		

Daily Temperature Values
Mouth of Shasta, 1994-2000

Attachment 2

Date	Maximu	Celsius Minimum	Mean
05/01/1997	16.7	11.4	13.8
05/02/1997	16.7	11.9	13.9
05/03/1997	13.3	13.3	15.2
05/04/1997	17.8	12.2	14.9
05/05/1997	19.4	13.6	16.1
05/06/1997	20.2	14.3	16.8
05/07/1997	21.1	14.3	17.3
05/08/1997	21.9	15.3	18.3
05/09/1997	23.1	[illegible]	19.2
05/10/1997	23.6	[illegible]	19.9
05/11/1997	25.0	17.7	21.0
05/12/1997	25.1	18.3	21.3
05/13/1997	23.7	18.0	20.8
05/14/1997	22.4	18.5	20.3
05/15/1997	23.7	18.5	20.7
05/16/1997	24.3	18.0	20.9
05/17/1997	25.3	18.0	21.5
05/18/1997	25.8	16.3	21.8
05/19/1997	25.1	18.1	21.3
05/20/1997	24.1	17.5	20.4
05/21/1997	23.1	11.8	19.3
05/22/1997	19.3	[illegible]	17.7
05/23/1997	19.3	15.9	17.3
05/24/1997	20.8	14.6	17.1
05/25/1997	21.1	13.4	17.0
05/26/1997	19.3	15.4	17.1
05/27/1997	20.8	16.1	18.2
05/28/1997	20.2	17.5	18.7
05/29/1997	23.2	16.7	19.8
05/30/1997	25.5	18.1	21.8
05/31/1997	22.9	18.8	20.8
			18.7
		11.38	
	25.82		

Date	Maximu	Celsius Minimum	Mean
09/01/1997	23.1	18.0	20.4
09/02/1997	23.2	17.7	20.1
09/03/1997	22.4	17.2	19.7
09/04/1997	23.2	17.7	20.3
09/05/1997	23.2	17.7	20.2
09/06/1997	23.1	17.3	20.0
09/07/1997	22.8	16.9	19.7
09/08/1997	21.7	16.5	19.0
09/09/1997	20.4	17.0	18.9
09/10/1997	22.1	16.8	19.1
09/11/1997	20.9	17.3	19.0
09/12/1997	21.7	16.7	19.0
09/13/1997	20.4	16.4	18.5
09/14/1997	18.1	15.9	17.0
09/15/1997	16.2	14.6	15.4
09/16/1997	17.8	13.9	15.7
09/17/1997	17.8	15.0	16.1
09/18/1997	17.3	13.1	15.0
09/19/1997	17.8	12.9	15.1
09/20/1997	18.5	13.3	15.8
09/21/1997	19.0	13.4	16.0
09/22/1997	19.4	14.0	16.7
09/23/1997	19.8	14.3	16.9
09/24/1997	19.8	14.8	17.0
09/25/1997	19.3	15.0	17.0
09/26/1997	19.0	15.4	16.9
09/27/1997	17.5	13.1	15.3
09/28/1997	18.0	13.3	15.5
09/29/1997	18.5	13.4	15.8
09/30/1997	17.2	14.3	15.7
			17.5
		12.84	
	23.23		

Date	Maximum	Celsius Minimum	Mean
05/01/1998			
05/02/1998			
05/03/1998			
05/04/1998			
05/05/1998			
05/06/1998			
05/07/1998			
05/08/1998			
05/09/1998			
05/10/1998			
05/11/1998			
05/12/1998			
05/13/1998			
05/14/1998			
05/15/1998			
05/16/1998			
05/17/1998			
05/18/1998			
05/19/1998			
05/20/1998	12.28	11.04	12.00143
05/21/1998	14.78	11.34	12.79375
05/22/1998	16.96	12.74	14.88458
05/23/1998	17.48	15.4	16.46875
05/24/1998	16.82	14.44	15.50417
05/25/1998	14.13	12.28	13.2725
05/26/1998	13.21	11.66	12.39417
05/27/1998	13.96	11.34	12.55292
05/28/1998	13.96	12.74	13.34375
05/29/1998	12.9	11.19	12.14708
05/30/1998	17.14	12.43	14.53833
05/31/1998	19.57	15.08	17.28125
			13.9
		11.04	
	19.57		

Date	Maximu	Celsius Minimum	Mean
09/01/1998	25.3	19.3	22.3
09/02/1998	25.7	19.8	22.7
09/03/1998	25.8	20.2	23.0
09/04/1998	25.8	20.7	23.3
09/05/1998	24.8	21.2	22.9
09/06/1998	23.7	19.6	21.7
09/07/1998	22.9	20.7	21.9
09/08/1998	22.1	19.0	20.6
09/09/1998	20.2	17.7	18.9
09/10/1998	20.9	15.9	18.2
09/11/1998	21.2	15.8	18.4
09/12/1998	21.9	16.5	19.1
09/13/1998	22.4	17.0	19.6
09/14/1998	22.7	17.2	19.9
09/15/1998	22.9	17.7	20.2
09/16/1998	22.2	17.5	19.8
09/17/1998	20.9	16.9	18.6
09/18/1998	18.6	15.8	17.0
09/19/1998	18.3	14.2	16.2
09/20/1998	18.6	13.7	16.1
09/21/1998	19.0	14.0	16.3
09/22/1998	18.8	13.7	16.1
09/23/1998	18.6	13.7	16.2
09/24/1998	18.8	14.0	16.3
09/25/1998	18.0	15.4	15.6
09/26/1998	17.0	13.9	15.5
09/27/1998	18.1	14.0	15.8
09/28/1998	17.7	14.5	15.8
09/29/1998	18.3	14.5	16.1
09/30/1998	18.5	14.6	16.3
			18.7
		13.71	
	25.82		

Daily Temperature Values
Mouth of Shasta, 1999-2000

Attachment 2

NBS data from Sharon Campbell

		Celsius	
Date	Maximum	Minimum	Mean
05/01/1999	17.2	13.4	15.0
05/02/1999	14.5	12.1	12.8
05/03/1999	13.8	10.6	12.0
05/04/1999	14.3	9.7	11.8
05/05/1999	16.3	10.2	13.1
05/06/1999	16.8	12.8	14.7
05/07/1999	16.1	11.1	13.5
05/08/1999	15.2	11.1	12.8
05/09/1999	15.1	10.3	12.8
05/10/1999	13.6	11.5	12.8
05/11/1999	15.0	12.4	13.4
05/12/1999	17.2	12.4	14.3
05/13/1999	14.9	11.8	13.1
05/14/1999	13.6	11.3	12.4
05/15/1999	15.6	10.4	12.7
05/16/1999	16.5	11.0	13.8
05/17/1999	18.6	14.0	16.0
05/18/1999	18.5	14.1	16.4
05/19/1999	19.1	14.1	16.5
05/20/1999	19.6	15.6	17.2
05/21/1999	18.8	14.2	16.5
05/22/1999	19.5	14.8	17.0
05/23/1999	21.5	16.1	18.7
05/24/1999	23.1	17.8	20.2
05/25/1999	22.2	18.2	20.2
05/26/1999	22.1	17.2	19.8
05/27/1999	23.0	18.3	20.8
05/28/1999	22.8	18.8	20.8
05/29/1999	20.8	17.5	19.2
05/30/1999	20.0	15.7	18.0
05/31/1999	21.28	15.6	18.8
			16.7
		9.65	
	23.08		

		Celsius	
Date	Maximum	Minimum	Mean
06/01/1999	18.8	13.53	16.86888
06/02/1999	20.54	14.48	17.33848
06/03/1999	20.71	14.77	17.82313
06/04/1999	21.03	14.61	17.79292
06/05/1999	21.87	15.57	18.6875
06/06/1999	22.2	16.66	19.22542
06/07/1999	21.87	16.04	18.80475
06/08/1999	22.2	16.2	19.10146
06/09/1999	21.03	16.99	18.98838
06/10/1999	21.03	16.52	18.89146
06/11/1999	21.2	16.04	18.45604
06/12/1999	21.2	15.66	18.4475
06/13/1999	21.37	16.04	18.86875
06/14/1999	21.7	16.04	18.71875
06/15/1999	20.87	15.88	18.30229
06/16/1999	20.54	16.04	18.29708
06/17/1999	20.71	15.66	18.29125
06/18/1999	20.87	15.66	18.33583
06/19/1999	21.03	16.36	18.67583
06/20/1999	21.03	16.2	18.82354
06/21/1999	20.71	16.52	18.65417
06/22/1999	21.03	15.88	18.47604
06/23/1999	21.03	16.36	18.63875
06/24/1999	20.54	16.2	18.40646
06/25/1999	19.8	16.2	17.72208
06/26/1999	17.75	13.99	15.77917
06/27/1999	16.66	12.61	14.89146
06/28/1999	16.36	12.29	14.27229
06/29/1999	16.83	11.83	14.20646
06/30/1999	17.31	12.29	14.70458
			17.8
		11.83	
	22.2		

		Celsius	
Date	Maximum	Minimum	Mean
05/01/2000	16.83	13.84	15.21583
05/02/2000	18.11	13.07	15.29667
05/03/2000	18.27	14.46	15.9175
05/04/2000	17.63	13.84	15.45083
05/05/2000	17.31	12.76	14.86083
05/06/2000	16.57	13.23	14.19104
05/07/2000	16.2	12.29	13.87188
05/08/2000	17.95	12.82	15.14958
05/09/2000	18.43	14.46	16.00708
05/10/2000	16.2	12.76	14.19479
05/11/2000	15.88	11.08	13.33104
05/12/2000	13.99	10.9	12.67125
05/13/2000	14.15	11.83	12.82646
05/14/2000	14.62	11.83	12.87792
05/15/2000	13.99	11.21	12.6
05/16/2000	16.52	11.83	13.78729
05/17/2000	17.63	13.07	15.33
05/18/2000	19.8	13.84	16.5875
05/19/2000	22.03	16.57	18.41583
05/20/2000	22.7	16.04	19.24125
05/21/2000	24.06	16.88	20.24475
05/22/2000	24.06	18.27	20.86438
05/23/2000	25.44	18.27	21.52583
05/24/2000	24.75	18.82	21.61604
05/25/2000	23.2	18.11	20.24917
05/26/2000	23.03	17.47	20.08083
05/27/2000	21.7	18.11	19.78396
05/28/2000	22.37	17.15	19.30417
05/29/2000	22.05	15.57	18.63167
05/30/2000	20.06	15.57	17.47396
05/31/2000	20.54	13.83	16.88083
			16.8
		10.9	
	25.44		

		Celsius	
Date	Maximum	Minimum	Mean
06/01/2000	19.9	17.0	18.2
06/02/2000	17.6	14.9	16.2
06/03/2000	18.9	14.1	16.5
06/04/2000	17.9	14.8	16.3
06/05/2000	19.4	14.5	16.6
06/06/2000	19.6	14.1	16.8
06/07/2000	20.9	14.9	17.7
06/08/2000	20.9	15.7	18.2
06/09/2000	20.5	14.8	17.6
06/10/2000	20.9	14.8	17.8
06/11/2000	22.5	16.5	19.4
06/12/2000	22.9	17.5	20.1
06/13/2000	21.5	17.6	19.6
06/14/2000	22.4	17.3	19.7
06/15/2000	22.8	17.9	20.1
06/16/2000	22.2	17.8	19.8
06/17/2000	22.2	18.8	19.9
06/18/2000	22.4	17.5	20.0
06/19/2000	22.8	18.4	20.5
06/20/2000	22.0	18.4	20.2
06/21/2000	21.0	17.5	19.3
06/22/2000	18.8	15.6	17.2
06/23/2000	17.1	13.2	15.3
06/24/2000	16.7	11.8	14.3
06/25/2000	16.8	11.8	14.3
06/26/2000	17.1	12.3	14.7
06/27/2000	17.6	12.8	15.2
06/28/2000	18.4	14.3	16.3
06/29/2000	18.8	14.8	16.5
06/30/2000	18.8	14.8	16.7
			17.7
		11.81667	
	22.86667		

Attachment 3

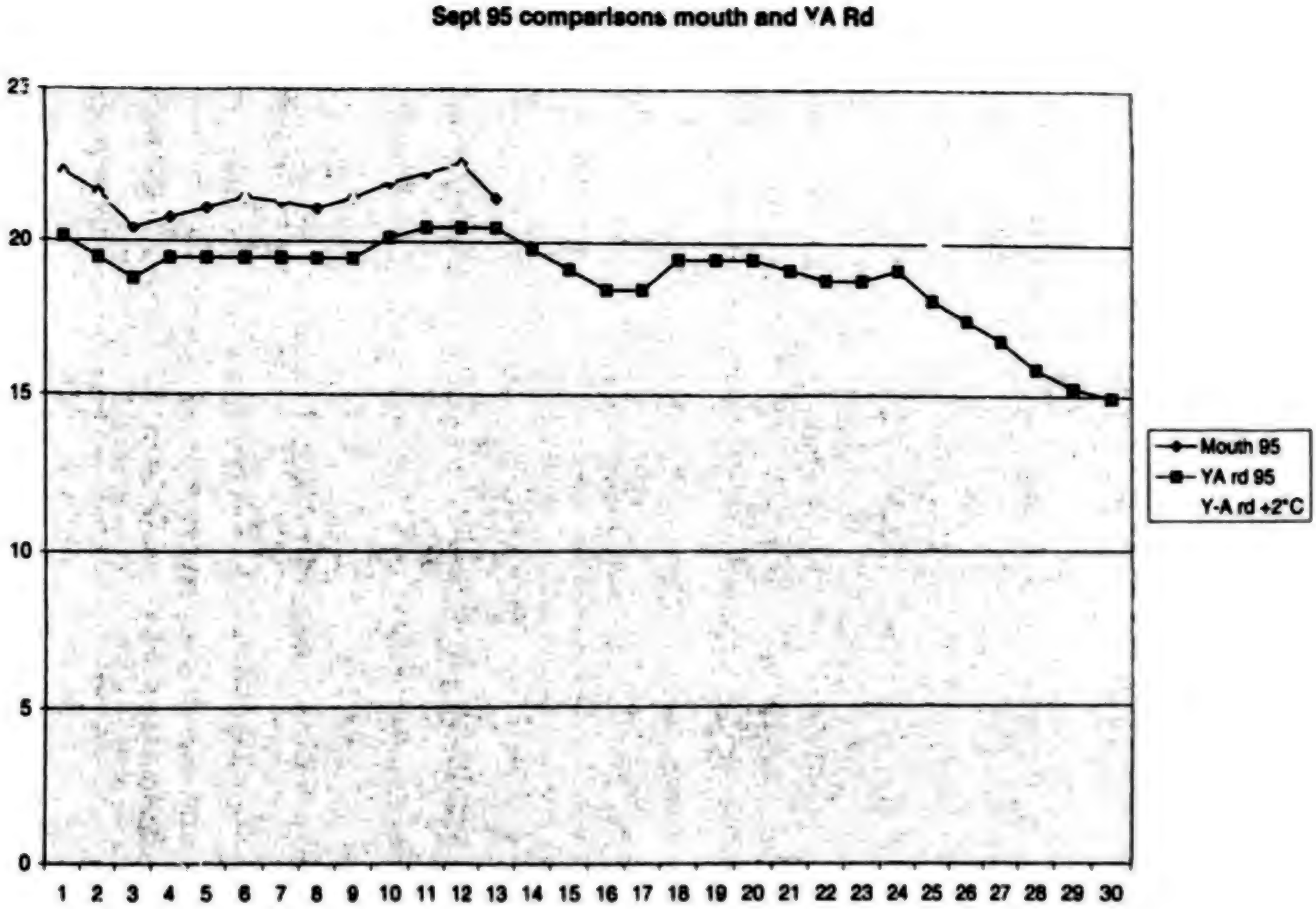
Temperature Summary
Mouth of the Shasta
May and Sept., 1965-2000

		1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Minimum												
May			16.7		17.0	12.0		12.5	13.5	17.5	14.0	
Sep		16.7		17.8		17.0	15.5	11.0	14.0	16.5	18.5	18.0
Max+min/2												
May			20.8		20.0	18.0		16.8	19.8	22.0	19.0	
Sep		20.5		21.1		20.5	19.0	16.3	20.0	20.0	22.3	21.3
Maximum												
May			25.0		23.0	24.0		21.0	26.0	26.5	24.0	
Sep		24.4		24.4		24.0	22.5	21.5	26.0	23.5	26.0	24.5

Attachment 3

Temperature Summary
Mouth of the Shasta
May and Sept., 1965-2000

1976	1977	1978			1994	1995	1996	1997	1998	1999.0	2000	
												Minimum
17.5	14.5	16.2			11.7		11.7	16.1	11.0	9.7	10.9	May
19.5	15.8				12.9	15.5	12.3	12.9	13.7	11.8	11.6	Sep
												Max+min/2
21.0	19.8	19.8			18.1		16.1	20.9	15.3	16.4	18.2	May
23.0	21.2				17.2	19.0	18.3	18.1	19.8	17.0	17.3	Sep
												Maximum
24.5	25.0	23.5			24.5		20.5	25.8	19.6	23.1	25.4	May
26.5	26.6				21.5	22.6	24.2	23.2	25.8	22.2	22.9	Sep
												Mean
					17.6		15.7	18.7	13.9	15.7	16.6	May
					17.4	18.9	17.1	17.5	18.7	17.8	17.7	Sept


Sept 95 comparisons mouth and YA Rd
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29
30
Mouth 95
YA rd 95
Y-A rd +2°C

May and Sept. Mouth of Shoals Data Summary 1994-2000

Mouth of Shoals, May and September Data

Date	Maximum	Celsius Minimum	Mean
05/01/1994	16.2	11.88	14.40333
05/02/1994	17.81	11.88	14.70667
05/03/1994	16.88	13.79	15.31667
05/04/1994	16.69	13.79	14.889
05/05/1994	17.18	13.16	15.27833
05/06/1994	17.18	14.68	15.89333
05/07/1994	18.13	14.35	16.57467
05/08/1994	21.21	15.89	18.352
05/09/1994	22.02	17.48	19.67133
05/10/1994	23.72	17.81	20.814
05/11/1994	23.35	16.47	20.02733
05/12/1994	22.27	17.18	19.77467
05/13/1994	21.84	15.89	18.722
05/14/1994	23.6	16.2	19.11467
05/15/1994	17.81	14.35	16.184
05/16/1994	16.02	13.48	14.81
05/17/1994	16.02	11.88	14.13333
05/18/1994	17.18	12.35	14.889
05/19/1994	17.81	13.79	15.86667
05/20/1994	18.47	14.04	16.21067
05/21/1994	17.18	14.89	16.229
05/22/1994	20.15	13.48	16.844
05/23/1994	21.9	16.67	18.912
05/24/1994	24.13	17.48	20.86333
05/25/1994	24.81	18.13	21.63667
05/26/1994	21.21	18.8	20.11733
05/27/1994	21.9	16.2	18.95267
05/28/1994	21.84	16.83	18.84333
05/29/1994	21.84	16.83	18.889
05/30/1994	23.01	15.89	19.43467
05/31/1994	22.27	18.13	20.48333
Mean			17.8
Min		11.88	
Max	24.81		

Date	Maximum	Celsius Minimum	Mean
09/07/1994	21.84	18.8	20.40833
09/08/1994	21.21	16.02	18.9495
09/09/1994	18.8	15.67	17.2825
09/10/1994	18.16	14.89	16.5475
09/11/1994	17.18	14.89	16.033
09/12/1994	17.48	13.16	15.4275
09/13/1994	17.81	12.88	15.4775
09/14/1994	18.16	13.48	15.838
09/15/1994	18.8	14.04	16.481
09/16/1994	19.79	14.35	17.031
09/17/1994	18.13	14.89	17.281
09/18/1994	20.15	14.89	17.023
09/19/1994	20.5	15.67	17.8845
09/20/1994	20.16	16.2	18.1235
09/21/1994	20.5	16.2	18.3256
09/22/1994	20.16	16.88	18.1316
09/23/1994	19.48	15.89	17.8845
09/24/1994	18.8	15.89	17.89
09/25/1994	19.48	16.2	18.1865
09/26/1994	20.16	15.89	18.0745
09/27/1994	18.8	16.89	17.7605
09/28/1994	18.8	16.02	17.429
09/29/1994	17.48	15.67	16.839
09/30/1994	17.18	14.35	15.9545
			17.4
		12.88	
	21.84		

Date	Maximum	Celsius Minimum	Mean
09/01/1995	22.27	16.01	19.4925
09/02/1995	21.01	16.29	18.6825
09/03/1995	23.48	16.48	19.129
09/04/1995	20.79	16.03	18.101
09/05/1995	21.1	16.48	18.2825
09/06/1995	21.44	16.04	18.789
09/07/1995	21.29	16.4	18.817
09/08/1995	21.1	16.04	18.8585
09/09/1995	21.44	16.29	18.8325
09/10/1995	21.84	16.71	19.258
09/11/1995	22.27	16.91	19.59
09/12/1995	22.69	17.04	19.8425
09/13/1995	21.44	17.26	19.08333
09/14/1995			
09/15/1995			
09/16/1995			
09/17/1995			
09/18/1995			
09/19/1995			
09/20/1995			
09/21/1995			
09/22/1995			
09/23/1995			
09/24/1995			
09/25/1995			
09/26/1995			
09/27/1995			
09/28/1995			
09/29/1995			
09/30/1995			
			19.3
		16.03	
	22.69		

Date	Maximum	Celsius Minimum	Mean
09/01/1996	24.25	18.12	21.08667
09/02/1996	24.25	18.12	20.88771
09/03/1996	23.09	17.68	20.34683
09/04/1996	21.04	16.05	18.68833
09/05/1996	20.22	14.78	17.49718
09/06/1996	20.64	14.16	17.28944
09/07/1996	21.04	14.68	17.52365
09/08/1996	22.2	16.05	19.12877
09/09/1996	23.2	16.64	20.02833
09/10/1996	23.37	17.32	20.23623
09/11/1996	20.67	16.89	18.80979
09/12/1996	18.79	15.89	17.286
09/13/1996	17.18	15.42	16.44604
09/14/1996	17.63	14.16	16.01177
09/15/1996	18.12	15.89	16.82239
09/16/1996	18.84	14.47	16.67864
09/17/1996	18.21	13.89	14.80863
09/18/1996	18.84	12.3	14.83854
09/19/1996	18.8	14.47	16.2738
09/20/1996	18.8	14.21	16.61271
09/21/1996	18.86	16.29	16.88052
09/22/1996	17	13.25	15.07983
09/23/1996	16.69	12.3	14.38827
09/24/1996	17.16	12.01	14.6801
09/25/1996	17.32	13.25	15.11125
09/26/1996	17.47	13.84	15.40229
09/27/1996	18.28	13.69	15.84448
09/28/1996	18.8	14	16.12708
09/29/1996	18.69	14.47	16.61167
09/30/1996	18.44	15.42	16.73823
			17.1
		12.3	
	24.25		

[illegible]

Date	Maximum	Celsius Minimum	Mean
[illegible]	18.7	11.4	13.3
[illegible]	18.7	11.8	13.9
[illegible]	18.5	13.3	16.2
[illegible]	17.8	13.3	14.8
[illegible]	18.4	13.8	16.1
[illegible]	20.2	14.8	16.8
[illegible]	21.1	14.5	17.3
[illegible]	21.9	16.3	18.3
[illegible]	23.1	16.1	18.2
[illegible]	23.8	16.7	19.9
[illegible]	23.6	17.7	21.0
[illegible]	25.1	18.9	21.3
[illegible]	23.7	18.0	20.8
[illegible]	22.4	18.5	20.3
[illegible]	23.7	18.6	20.7
[illegible]	24.3	18.3	20.9
[illegible]	23.3	18.9	21.6
[illegible]	23.8	18.3	21.6
[illegible]	25.1	18.1	21.5
[illegible]	24.1	17.8	20.4
[illegible]	23.1	16.8	19.3
[illegible]	19.3	16.1	17.7
[illegible]	19.3	15.8	17.3
[illegible]	20.0	14.8	17.1
[illegible]	21.1	13.4	17.0
[illegible]	19.3	15.4	17.1
[illegible]	20.0	16.1	18.2
[illegible]	23.2	17.5	18.7
[illegible]	23.2	16.7	19.8
[illegible]	23.6	16.1	21.6
[illegible]	23.0	18.0	20.8
			18.7
		11.38	
	25.03		

Date	Maximum	Celsius Minimum	Mean
[illegible]	23.1	18.5	20.4
[illegible]	23.3	17.7	20.1
[illegible]	22.4	17.2	19.7
[illegible]	23.2	17.7	20.3
[illegible]	23.3	17.7	20.3
[illegible]	23.1	17.3	20.0
[illegible]	22.9	16.9	19.7
[illegible]	21.7	18.5	19.8
[illegible]	23.4	17.8	19.9
[illegible]	22.1	16.9	19.1
[illegible]	20.8	17.2	19.0
[illegible]	21.7	16.7	18.5
[illegible]	20.4	16.4	18.5
[illegible]	19.1	15.8	17.0
[illegible]	18.2	14.9	15.4
[illegible]	17.8	13.8	15.7
[illegible]	17.8	15.0	16.1
[illegible]	17.3	13.1	15.0
[illegible]	17.8	12.9	15.1
[illegible]	18.5	13.3	15.9
[illegible]	18.8	13.4	15.8
[illegible]	18.4	14.8	16.7
[illegible]	18.8	14.3	16.8
[illegible]	18.8	14.0	17.0
[illegible]	18.3	15.8	17.0
[illegible]	18.8	15.4	16.9
[illegible]	17.8	13.1	16.3
[illegible]	18.8	13.3	15.8
[illegible]	18.8	13.4	15.8
[illegible]	17.2	14.3	15.7
			17.8
		12.94	
	23.35		

Date	Maximum	Celsius Minimum	Mean
[illegible]			
[illegible]			
[illegible]			
[illegible]			
[illegible]			
[illegible]			
[illegible]			
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[illegible]			
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[illegible]			
[illegible]			
[illegible]			
[illegible]			
[illegible]			
[illegible]			
[illegible]			
[illegible]	13.35	11.04	12.02143
[illegible]	14.79	11.34	12.79375
[illegible]	16.03	12.74	14.30458
[illegible]	17.43	16.4	16.03875
[illegible]	16.03	14.44	15.03417
[illegible]	14.13	12.28	13.2729
[illegible]	13.21	11.03	12.23417
[illegible]	13.68	11.28	12.68083
[illegible]	13.88	12.74	13.24375
[illegible]	12.9	11.19	12.14792
[illegible]	17.14	12.48	14.08083
[illegible]	18.67	16.03	17.20125
			13.9
		11.04	
	18.67		

Date	Maximum	Celsius Minimum	Mean
[illegible]	25.3	19.3	22.5
[illegible]	25.7	19.6	22.7
[illegible]	25.6	20.2	23.0
[illegible]	25.8	20.7	23.3
[illegible]	24.6	21.2	22.9
[illegible]	23.7	19.8	21.7
[illegible]	23.0	20.7	21.6
[illegible]	22.1	19.0	20.9
[illegible]	20.2	17.7	18.8
[illegible]	20.8	15.9	18.2
[illegible]	21.3	15.6	18.4
[illegible]	21.0	16.5	19.1
[illegible]	22.4	17.8	19.8
[illegible]	22.7	17.3	19.9
[illegible]	22.8	17.7	20.2
[illegible]	22.2	17.6	19.8
[illegible]	20.8	16.9	18.8
[illegible]	18.8	15.8	17.0
[illegible]	18.3	14.2	16.2
[illegible]	16.8	13.7	16.1
[illegible]	18.5	14.5	16.3
[illegible]	18.8	13.7	16.1
[illegible]	18.8	13.7	16.2
[illegible]	16.8	14.5	16.3
[illegible]	18.9	15.4	16.9
[illegible]	17.8	13.8	15.8
[illegible]	18.1	14.8	15.8
[illegible]	17.7	14.5	15.9
[illegible]	16.3	14.5	16.1
[illegible]	16.8	14.0	16.3
			16.7
		13.71	
	25.83		

May and Sept. Month of [illegible] Data Summary 1994-2000

[illegible] data from [illegible]

Date	Maximum	Celsius Minimum	Mean
[illegible]	17.2	13.4	15.3
[illegible]	14.8	12.1	12.9
[illegible]	13.8	10.8	12.5
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[illegible]	20.8	16.7	18.8
[illegible]	21.25	16.8	18.8
			16.7
		8.69	
	23.23		

Date	Maximum	Celsius Minimum	Mean
[illegible]	19.8	13.83	[illegible]
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[illegible]	20.71	16.02	[illegible]
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[illegible]	21.88	15.85	[illegible]
[illegible]	20.84	16.2	[illegible]
[illegible]	19.8	16.2	[illegible]
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[illegible]	18.85	11.63	[illegible]
[illegible]	17.31	12.23	[illegible]
			17.8
		11.63	
	22.2		

Date	Maximum	Celsius Minimum	Mean
[illegible]	16.83	13.04	15.21583
[illegible]	18.11	13.07	[illegible]
[illegible]	16.27	14.49	15.6175
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[illegible]	17.31	12.79	[illegible]
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[illegible]	17.85	12.82	[illegible]
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[illegible]	16.85	11.83	[illegible]
[illegible]	13.83	10.8	12.07125
[illegible]	14.15	11.83	[illegible]
[illegible]	14.62	11.83	[illegible]
[illegible]	15.85	11.21	12.8
[illegible]	16.82	11.83	[illegible]
[illegible]	17.83	13.07	15.25
[illegible]	18.9	13.04	[illegible]
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			16.8
		10.8	
	23.44		

Date	Maximum	Celsius Minimum	Mean
[illegible]	19.8	17.0	18.2
[illegible]	17.5	14.8	16.2
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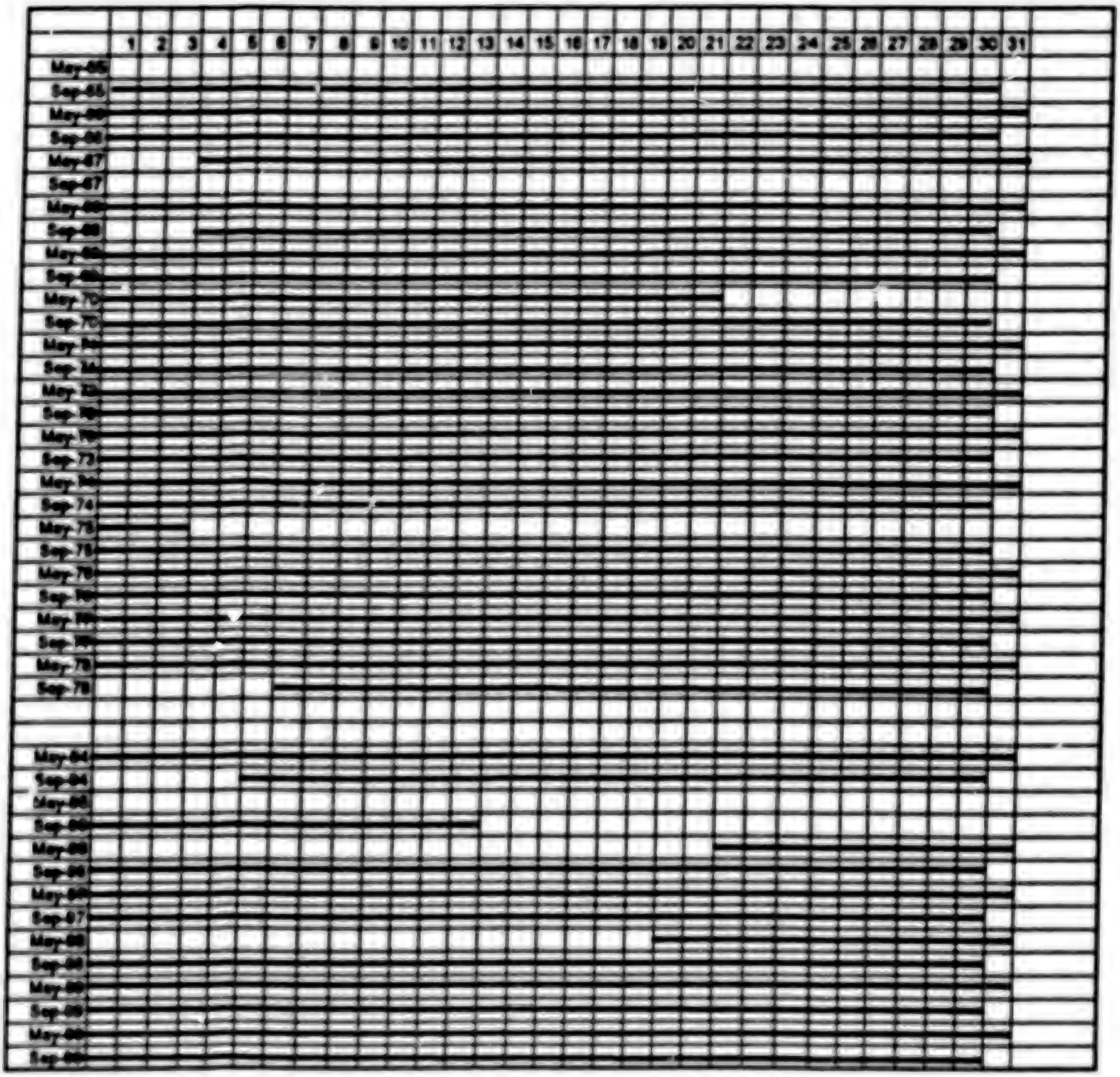
[illegible]	17.8	14.8	16.3
[illegible]	19.4	14.8	16.8
[illegible]	19.6	14.1	16.6
[illegible]	20.8	14.9	17.7
[illegible]	20.8	15.7	18.2
[illegible]	20.8	14.8	17.8
[illegible]	20.8	14.8	17.8
[illegible]	22.5	16.5	19.4
[illegible]	22.8	17.6	20.1
[illegible]	21.6	17.6	19.6
[illegible]	22.4	17.3	19.7
[illegible]	22.8	17.8	20.1
[illegible]	22.3	17.6	19.8
[illegible]	22.2	16.8	19.6
[illegible]	22.4	17.6	20.0
[illegible]	22.8	18.4	20.6
[illegible]	22.6	18.4	20.2
[illegible]	21.6	17.6	19.2
[illegible]	19.8	16.8	17.2
[illegible]	17.1	15.2	16.3
[illegible]	16.7	11.8	14.3
[illegible]	16.8	11.8	14.3
[illegible]	17.1	12.5	14.7
[illegible]	17.8	12.8	15.2
[illegible]	18.4	14.3	16.3
[illegible]	18.8	14.8	16.5
[illegible]	18.8	14.8	16.7
			17.7
		11.81667	
	22.83667		

Attachment 4

Temperature Data Availability

Mouth of Shasta



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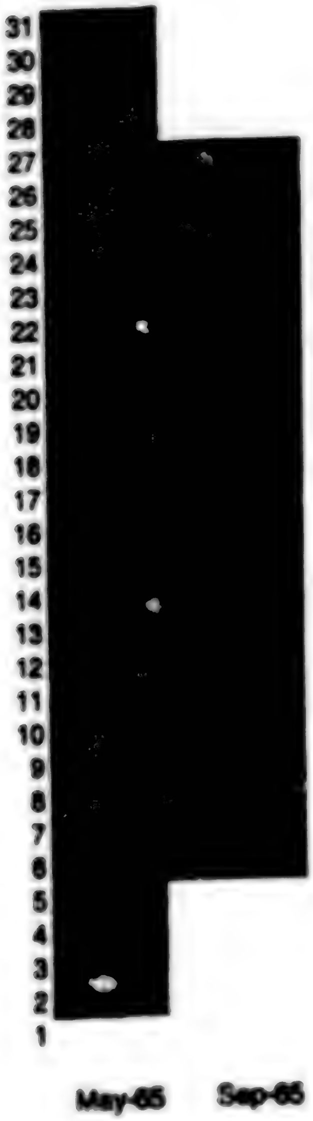
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May-65
Sep-65

Attachment 5

Monthly Flow Data,
Mouth of Shasta May and September

	Max	Min	Mean
Sep-65	138	60	92
May-66	92	45	66
Sep-66	127	15	62
May-67	471	132	231
May-68	103	38	64
Sep-68	99	29	57
May-69	195	68	123
Sep-69	129	44	81
May-70	208	91	135
Sep-70	115	22	59
May-71	591	197	359
Sep-71	172	46	85
May-72	302	40	106
Sep-72	183	30	81
May-73	110	40	65
Sep-73	125	14	55
May-74	312	117	214
Sep-74	116	38	72
May-75	440	216	297
Sep-75	116	48	75
May-76	144	44	87
Sep-76	125	32	73
May-77	148	51	85
Sep-77	129	9	31
May-78	203	93	133
Sep-78	453	80	182
May-79	282	54	134
Sep-79	119	49	71
May-94	194	42	78
Sep-94	66	13	30
May-95	445	115	261
Sep-95	87	47	63
May-96	275	91	168
Sep-96	117	39	78
May-97	171	52	105
Sep-97	140	42	86
May-98	1090	255	678
Sep-98	153	57	101
May-99	285	195	227
Sep-99	114	62	79
May-00	184	113	149
Sep-00	102	34	65

	Max	Min	Mean
May-66	92	45	66
May-67	471	132	231
May-68	103	38	64
May-69	195	68	123
May-70	208	91	135
May-71	591	197	359
May-72	302	40	106
May-73	110	40	65
May-74	312	117	214
May-75	440	216	297
May-76	144	44	87
May-77	148	51	85
May-78	203	93	133
May-79	282	54	134
May-94	194	42	78
May-95	445	115	261
May-96	275	91	168
May-97	171	52	105
May-98	1090	255	678
May-99	285	195	227
May-00	184	113	149
Average	297	99	179
median		91	

	Max	Min	Mean
Sep-65	138	60	92
Sep-66	127	15	62
Sep-68	99	29	57
Sep-69	129	44	81
Sep-70	115	22	59
Sep-71	172	46	85
Sep-72	183	30	81
Sep-73	125	14	55
Sep-74	116	38	72
Sep-75	116	48	75
Sep-76	125	32	73
Sep-77	129	9	31
Sep-78	453	80	182
Sep-79	119	49	71
Sep-94	66	13	30
Sep-95	87	47	63
Sep-96	117	39	78
Sep-97	140	42	86
Sep-98	153	57	101
Sep-99	114	62	79
Sep-00	102	34	65
average	139	39	75
median		39	

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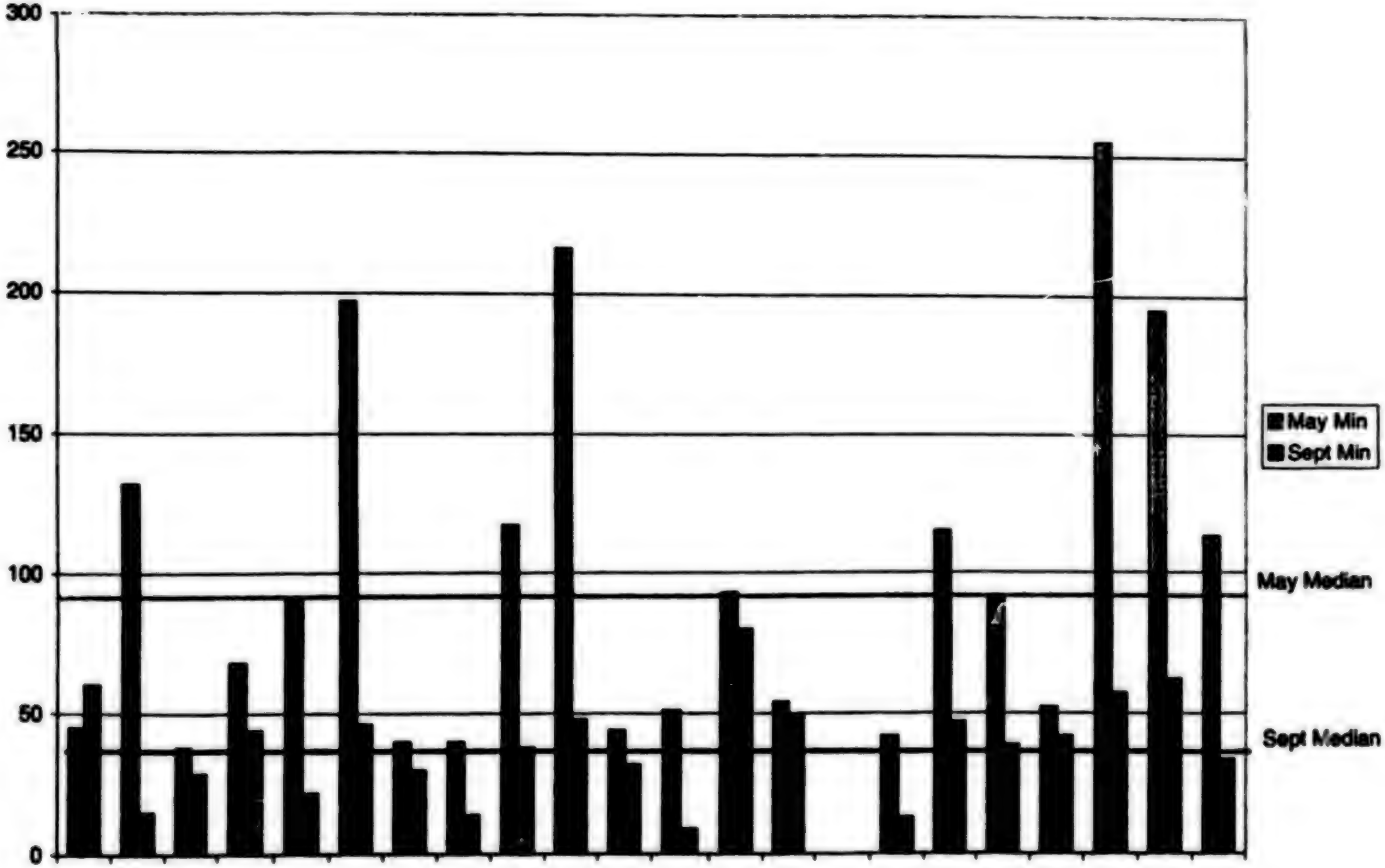
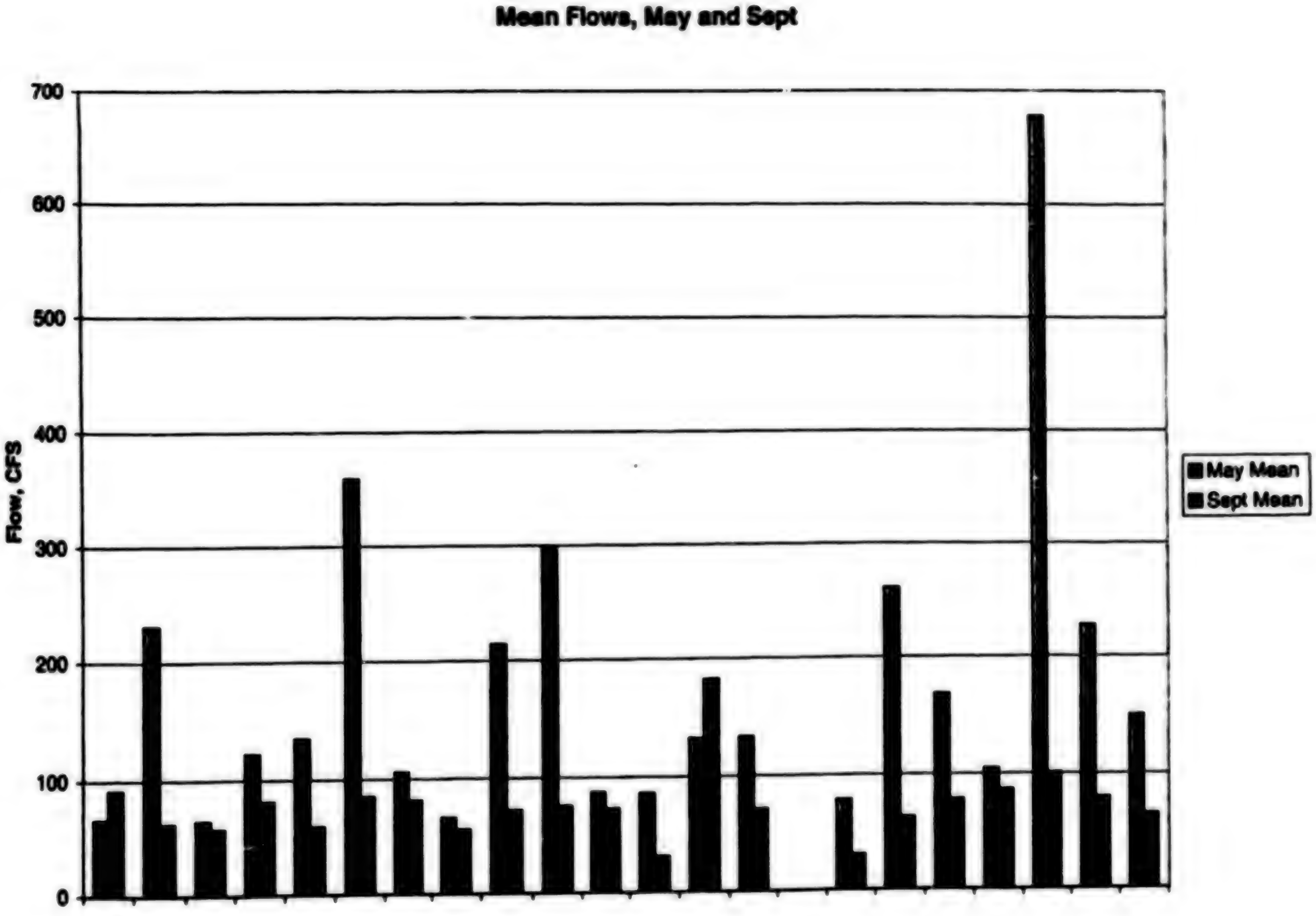
Minimum flows, May and September, Shasta River




Mean Flows, May and Sept
Flow, CFS
700
600
500
400
300
200
100
0
■ May Mean
■ Sept Mean

2000 data preliminary

09/01/1965	84	05/01/1966	71	09/01/1966	18
09/02/1965	94	05/02/1966	72	09/02/1966	16
09/03/1965	111	05/03/1966	68	09/03/1966	24
09/04/1965	93	05/04/1966	66	09/04/1966	23
09/05/1965	90	05/05/1966	73	09/05/1966	18
09/06/1965	90	05/06/1966	67	09/06/1966	16
09/07/1965	101	05/07/1966	73	09/07/1966	16
09/08/1965	113	05/08/1966	80	09/08/1966	15
09/09/1965	105	05/09/1966	83	09/09/1966	15
09/10/1965	76	05/10/1966	75	09/10/1966	18
09/11/1965	70	05/11/1966	68	09/11/1966	24
09/12/1965	76	05/12/1966	66	09/12/1966	36
09/13/1965	74	05/13/1966	66	09/13/1966	42
09/14/1965	65	05/14/1966	71	09/14/1966	48
09/15/1965	61	05/15/1966	77	09/15/1966	45
09/16/1965	60	05/16/1966	74	09/16/1966	44
09/17/1965	66	05/17/1966	70	09/17/1966	45
09/18/1965	70	05/18/1966	71	09/18/1966	65
09/19/1965	89	05/19/1966	63	09/19/1966	114
09/20/1965	102	05/20/1966	59	09/20/1966	109
09/21/1965	109	05/21/1966	53	09/21/1966	120
09/22/1965	95	05/22/1966	51	09/22/1966	127
09/23/1965	99	05/23/1966	55	09/23/1966	122
09/24/1965	96	05/24/1966	45	09/24/1966	120
09/25/1965	104	05/25/1966	45	09/25/1966	120
09/26/1965	110	05/26/1966	46	09/26/1966	124
09/27/1965	108	05/27/1966	46	09/27/1966	124
09/28/1965	99	05/28/1966	57	09/28/1966	120
09/29/1965	102	05/29/1966	63	09/29/1966	83
09/30/1965	136	05/30/1966	77	09/30/1966	54
		05/31/1966	92		

Sep-65		May-66		Sep-66	
Max	136	Max	92	Max	127
Min	60	Min	45	Min	15
Mean	92	Mean	66	Mean	62

	Sep-65		May-66		Sep-66
Max	136	Max	92	Max	127
Min	60	Min	45	Min	15
Mean	91.5	Mean	65.9	Mean	62.2

Sep-65	136	60	91.5
May-66	92	45	65.9
Sep-66	127	15	62.2

May-67	471	132	230.7
May-68	103	38	64.3
Sep-68	99	29	57.4
May-69	195	68	122.6
Sep-69	129	44	80.7
May-70	206	91	135.3
Sep-70	115	22	59.1
May-71	591	197	359.0
Sep-71	172	46	84.8
May-72	302	40	105.6
Sep-72	183	30	80.9
May-73	110	40	65.4
Sep-73	125	14	55.4
May-74	312	117	213.9
Sep-74	116	38	71.7
May-75	440	216	297.1
Sep-75	116	48	75.2
May-76	144	44	86.8
Sep-76	125	32	72.7
May-77	148	51	85.5
Sep-77	129	9	30.9
May-78	203	93	132.6
Sep-78	453	80	182.3
May-79	282	54	133.5
Sep-79	119	49	70.6
May-94	194	42	78.2
Sep-94	68	13	30.0
May-95	445	115	261.1
Sep-95	87	47	62.9
May-96	275	91	167.8
Sep-96	117	39	78.0
May-97	171	52	104.6
Sep-97	140	42	86.4
May-98	1090	256	677.5
Sep-98	153	57	100.7
May-99	285	195	227.1
Sep-99	114	62	79.2
May-00	184	113	149.4
Sep-00	102	34	64.7

05/01/1967	198	05/01/1968	64	09/01/1968	61
05/02/1967	187	05/02/1968	53	09/02/1968	61
05/03/1967	196	05/03/1968	45	09/03/1968	55
05/04/1967	164	05/04/1968	45	09/04/1968	39
05/05/1967	151	05/05/1968	38	09/05/1968	30
05/06/1967	146	05/06/1968	43	09/06/1968	37
05/07/1967	153	05/07/1968	58	09/07/1968	42
05/08/1967	181	05/08/1968	61	09/08/1968	42
05/09/1967	336	05/09/1968	53	09/09/1968	39
05/10/1967	455	05/10/1968	45	09/10/1968	34
05/11/1967	440	05/11/1968	46	09/11/1968	58
05/12/1967	471	05/12/1968	53	09/12/1968	67
05/13/1967	391	05/13/1968	56	09/13/1968	48
05/14/1967	290	05/14/1968	53	09/14/1968	34
05/15/1967	240	05/15/1968	58	09/15/1968	29
05/16/1967	247	05/16/1968	53	09/16/1968	41
05/17/1967	223	05/17/1968	55	09/17/1968	39
05/18/1967	240	05/18/1968	58	09/18/1968	41
05/19/1967	238	05/19/1968	53	09/19/1968	37
05/20/1967	245	05/20/1968	62	09/20/1968	40
05/21/1967	240	05/21/1968	64	09/21/1968	68
05/22/1967	242	05/22/1968	101	09/22/1968	68
05/23/1967	218	05/23/1968	103	09/23/1968	78
05/24/1967	198	05/24/1968	97	09/24/1968	73
05/25/1967	178	05/25/1968	99	09/25/1968	85
05/26/1967	154	05/26/1968	95	09/26/1968	87
05/27/1967	132	05/27/1968	97	09/27/1968	87
05/28/1967	149	05/28/1968	99	09/28/1968	99
05/29/1967	152	05/29/1968	80	09/29/1968	99
05/30/1967	152	05/30/1968	59	09/30/1968	97
05/31/1967	150	05/31/1968	46		
May-67		May-68		Sep-68	
Max	471	Max	103	Max	99
Min	132	Min	38	Min	29
Mean	231	Mean	64	Mean	57

	May-67		May-68		Sep-68
Max	471	Max	103	Max	99
Min	132	Min	38	Min	29
Mean	230.7	Mean	64.3	Mean	57.4

05/01/1969	171	09/01/1969	66	05/01/1970	177
05/02/1969	164	09/02/1969	80	05/02/1970	191
05/03/1969	148	09/03/1969	73	05/03/1970	173
05/04/1969	130	09/04/1969	68	05/04/1970	158
05/05/1969	125	09/05/1969	74	05/05/1970	112
05/06/1969	122	09/06/1969	71	05/06/1970	115
05/07/1969	106	09/07/1969	72	05/07/1970	128
05/08/1969	105	09/08/1969	78	05/08/1970	138
05/09/1969	97	09/09/1969	66	05/09/1970	132
05/10/1969	97	09/10/1969	56	05/10/1970	140
05/11/1969	117	09/11/1969	44	05/11/1970	195
05/12/1969	127	09/12/1969	45	05/12/1970	208
05/13/1969	195	09/13/1969	49	05/13/1970	203
05/14/1969	159	09/14/1969	58	05/14/1970	181
05/15/1969	157	09/15/1969	55	05/15/1970	165
05/16/1969	134	09/16/1969	49	05/16/1970	133
05/17/1969	122	09/17/1969	54	05/17/1970	113
05/18/1969	117	09/18/1969	74	05/18/1970	107
05/19/1969	122	09/19/1969	72	05/19/1970	116
05/20/1969	129	09/20/1969	81	05/20/1970	131
05/21/1969	133	09/21/1969	105	05/21/1970	123
05/22/1969	112	09/22/1969	111	05/22/1970	112
05/23/1969	104	09/23/1969	117	05/23/1970	108
05/24/1969	108	09/24/1969	127	05/24/1970	112
05/25/1969	118	09/25/1969	129	05/25/1970	114
05/26/1969	130	09/26/1969	111	05/26/1970	93
05/27/1969	133	09/27/1969	93	05/27/1970	91
05/28/1969	104	09/28/1969	104	05/28/1970	97
05/29/1969	74	09/29/1969	124	05/29/1970	117
05/30/1969	68	09/30/1969	116	05/30/1970	117
05/31/1969	74			05/31/1970	113
May-69		Sep-69		May-70	
Max	195	Max	129	Max	208
Min	68	Min	44	Min	91
Mean	123	Mean	81	Mean	135
		Mean	81		

	May-69		Sep-69		May-70
Max	195	Max	129	Max	208
Min	68	Min	44	Min	91
Mean	122.6	Mean	80.7	Mean	135.3

09/01/1970	24
09/02/1970	22
09/03/1970	43
09/04/1970	38
09/05/1970	78
09/06/1970	64
09/07/1970	70
09/08/1970	69
09/09/1970	43
09/10/1970	38
09/11/1970	33
09/12/1970	34
09/13/1970	30
09/14/1970	28
09/15/1970	55
09/16/1970	48
09/17/1970	45
09/18/1970	50
09/19/1970	56
09/20/1970	62
09/21/1970	56
09/22/1970	69
09/23/1970	78
09/24/1970	70
09/25/1970	64
09/26/1970	78
09/27/1970	95
09/28/1970	112
09/29/1970	111
09/30/1970	115

Sep-70	
Max	115
Min	22
Mean	59

05/01/1971	248
05/02/1971	281
05/03/1971	432
05/04/1971	588
05/05/1971	591
05/06/1971	527
05/07/1971	439
05/08/1971	486
05/09/1971	537
05/10/1971	520
05/11/1971	437
05/12/1971	378
05/13/1971	382
05/14/1971	354
05/15/1971	329
05/16/1971	329
05/17/1971	322
05/18/1971	300
05/19/1971	255
05/20/1971	215
05/21/1971	208
05/22/1971	209
05/23/1971	202
05/24/1971	197
05/25/1971	204
05/26/1971	408
05/27/1971	428
05/28/1971	384
05/29/1971	351
05/30/1971	307
05/31/1971	308

May-71	
Max	591
Min	197
Mean	359

09/01/1971	47
09/02/1971	46
09/03/1971	48
09/04/1971	54
09/05/1971	50
09/06/1971	67
09/07/1971	71
09/08/1971	65
09/09/1971	62
09/10/1971	63
09/11/1971	68
09/12/1971	78
09/13/1971	94
09/14/1971	69
09/15/1971	55
09/16/1971	60
09/17/1971	60
09/18/1971	60
09/19/1971	87
09/20/1971	103
09/21/1971	97
09/22/1971	116
09/23/1971	124
09/24/1971	125
09/25/1971	129
09/26/1971	121
09/27/1971	121
09/28/1971	115
09/29/1971	130
09/30/1971	172

Sep-71	
Max	172
Min	46
Mean	85

	Sep-70
Max	115
Min	22
Mean	59.1

	May-71
Max	591
Min	197
Mean	359.0

	Sep-71
Max	172
Min	46
Mean	84.8

05/01/1972	101	09/01/1972	30	05/01/1973	101
05/02/1972	88	09/02/1972	51	05/02/1973	88
05/03/1972	69	09/03/1972	42	05/03/1973	69
05/04/1972	65	09/04/1972	57	05/04/1973	65
05/05/1972	84	09/05/1972	64	05/05/1973	84
05/06/1972	82	09/06/1972	54	05/06/1973	82
05/07/1972	78	09/07/1972	44	05/07/1973	78
05/08/1972	69	09/08/1972	38	05/08/1973	69
05/09/1972	51	09/09/1972	36	05/09/1973	51
05/10/1972	51	09/10/1972	39	05/10/1973	51
05/11/1972	49	09/11/1972	51	05/11/1973	49
05/12/1972	45	09/12/1972	45	05/12/1973	45
05/13/1972	44	09/13/1972	48	05/13/1973	44
05/14/1972	60	09/14/1972	55	05/14/1973	60
05/15/1972	110	09/15/1972	62	05/15/1973	110
05/16/1972	100	09/16/1972	64	05/16/1973	90
05/17/1972	111	09/17/1972	62	05/17/1973	88
05/18/1972	126	09/18/1972	69	05/18/1973	78
05/19/1972	122	09/19/1972	76	05/19/1973	66
05/20/1972	134	09/20/1972	78	05/20/1973	61
05/21/1972	302	09/21/1972	88	05/21/1973	71
05/22/1972	300	09/22/1972	126	05/22/1973	59
05/23/1972	252	09/23/1972	135	05/23/1973	54
05/24/1972	195	09/24/1972	135	05/24/1973	55
05/25/1972	188	09/25/1972	132	05/25/1973	63
05/26/1972	168	09/26/1972	135	05/26/1973	66
05/27/1972	43	09/27/1972	183	05/27/1973	43
05/28/1972	47	09/28/1972	149	05/28/1973	47
05/29/1972	48	09/29/1972	137	05/29/1973	48
05/30/1972	40	09/30/1972	143	05/30/1973	40
05/31/1972	53			05/31/1973	53
May-72		Sep-72		May-73	
Max	302	Max	183	Max	110
Min	40	Min	30	Min	40
Mean	106	Mean	81	Mean	65

	May-72		Sep-72		May-73
Max	302	Max	183	Max	110
Min	40	Min	30	Min	40
Mean	105.6	Mean	80.9	Mean	65.4

09/01/1973	14	05/01/1974	312	09/01/1974	62
09/02/1973	14	05/02/1974	299	09/02/1974	57
09/03/1973	21	05/03/1974	293	09/03/1974	54
09/04/1973	23	05/04/1974	276	09/04/1974	48
09/05/1973	22	05/05/1974	267	09/05/1974	39
09/06/1973	21	05/06/1974	269	09/06/1974	38
09/07/1973	23	05/07/1974	271	09/07/1974	45
09/08/1973	24	05/08/1974	259	09/08/1974	50
09/09/1973	23	05/09/1974	252	09/09/1974	69
09/10/1973	26	05/10/1974	263	09/10/1974	83
09/11/1973	30	05/11/1974	276	09/11/1974	76
09/12/1973	31	05/12/1974	268	09/12/1974	79
09/13/1973	29	05/13/1974	249	09/13/1974	83
09/14/1973	25	05/14/1974	238	09/14/1974	75
09/15/1973	25	05/15/1974	208	09/15/1974	83
09/16/1973	20	05/16/1974	217	09/16/1974	92
09/17/1973	19	05/17/1974	225	09/17/1974	70
09/18/1973	22	05/18/1974	225	09/18/1974	54
09/19/1973	28	05/19/1974	187	09/19/1974	58
09/20/1973	110	05/20/1974	188	09/20/1974	62
09/21/1973	125	05/21/1974	174	09/21/1974	71
09/22/1973	110	05/22/1974	148	09/22/1974	75
09/23/1973	109	05/23/1974	141	09/23/1974	78
09/24/1973	122	05/24/1974	131	09/24/1974	90
09/25/1973	120	05/25/1974	122	09/25/1974	87
09/26/1973	100	05/26/1974	117	09/26/1974	76
09/27/1973	90	05/27/1974	137	09/27/1974	77
09/28/1973	109	05/28/1974	159	09/28/1974	92
09/29/1973	109	05/29/1974	172	09/29/1974	110
09/30/1973	118	05/30/1974	148	09/30/1974	118
		05/31/1974	141		

Sep-73		May-74		Sep-74	
Max	125	Max	312	Max	118
Min	14	Min	117	Min	38
Mean	55	Mean	214	Mean	72

	Sep-73		May-74		Sep-74
Max	125	Max	312	Max	118
Min	14	Min	117	Min	38
Mean	55.4	Mean	213.9	Mean	71.7

05/01/1975	218	09/01/1975	69	05/01/1976	94
05/02/1975	216	09/02/1975	65	05/02/1976	90
05/03/1975	216	09/03/1975	63	05/03/1976	94
05/04/1975	222	09/04/1975	63	05/04/1976	100
05/05/1975	248	09/05/1975	64	05/05/1976	101
05/06/1975	282	09/06/1975	69	05/06/1976	92
05/07/1975	240	09/07/1975	65	05/07/1976	105
05/08/1975	222	09/08/1975	60	05/08/1976	115
05/09/1975	238	09/09/1975	48	05/09/1976	123
05/10/1975	282	09/10/1975	54	05/10/1976	144
05/11/1975	328	09/11/1975	60	05/11/1976	140
05/12/1975	348	09/12/1975	57	05/12/1976	134
05/13/1975	330	09/13/1975	76	05/13/1976	121
05/14/1975	370	09/14/1975	104	05/14/1976	102
05/15/1975	400	09/15/1975	116	05/15/1976	102
05/16/1975	440	09/16/1975	72	05/16/1976	105
05/17/1975	408	09/17/1975	76	05/17/1976	84
05/18/1975	376	09/18/1975	85	05/18/1976	73
05/19/1975	354	09/19/1975	74	05/19/1976	71
05/20/1975	370	09/20/1975	66	05/20/1976	68
05/21/1975	350	09/21/1975	67	05/21/1976	63
05/22/1975	285	09/22/1975	79	05/22/1976	66
05/23/1975	250	09/23/1975	83	05/23/1976	62
05/24/1975	288	09/24/1975	73	05/24/1976	56
05/25/1975	275	09/25/1975	83	05/25/1976	52
05/26/1975	288	09/26/1975	93	05/26/1976	47
05/27/1975	254	09/27/1975	94	05/27/1976	44
05/28/1975	270	09/28/1975	93	05/28/1976	56
05/29/1975	282	09/29/1975	98	05/29/1976	67
05/30/1975	300	09/30/1975	88	05/30/1976	54
05/31/1975	319			05/31/1976	66
May-75		Sep-75		May-76	
Max	440	Max	116	Max	144
Min	216	Min	48	Min	44
Mean	297	Mean	75	Mean	87

	May-75		Sep-75		May-76
Max	440	Max	116	Max	144
Min	216	Min	48	Min	44
Mean	297.1	Mean	75.2	Mean	86.8

09/01/1976	67	05/01/1977	51	09/01/1977	20
09/02/1976	49	05/02/1977	53	09/02/1977	18
09/03/1976	49	05/03/1977	59	09/03/1977	17
09/04/1976	47	05/04/1977	58	09/04/1977	12
09/05/1976	37	05/05/1977	57	09/05/1977	10
09/06/1976	36	05/06/1977	78	09/06/1977	16
09/07/1976	42	05/07/1977	69	09/07/1977	23
09/08/1976	43	05/08/1977	61	09/08/1977	15
09/09/1976	33	05/09/1977	59	09/09/1977	10
09/10/1976	32	05/10/1977	74	09/10/1977	13
09/11/1976	39	05/11/1977	96	09/11/1977	15
09/12/1976	53	05/12/1977	144	09/12/1977	13
09/13/1976	60	05/13/1977	109	09/13/1977	9
09/14/1976	69	05/14/1977	85	09/14/1977	10
09/15/1976	64	05/15/1977	79	09/15/1977	10
09/16/1976	83	05/16/1977	71	09/16/1977	16
09/17/1976	99	05/17/1977	70	09/17/1977	21
09/18/1976	105	05/18/1977	71	09/18/1977	22
09/19/1976	95	05/19/1977	72	09/19/1977	23
09/20/1976	86	05/20/1977	79	09/20/1977	29
09/21/1976	85	05/21/1977	69	09/21/1977	32
09/22/1976	70	05/22/1977	60	09/22/1977	30
09/23/1976	86	05/23/1977	139	09/23/1977	35
09/24/1976	82	05/24/1977	141	09/24/1977	39
09/25/1976	116	05/25/1977	148	09/25/1977	57
09/26/1976	125	05/26/1977	139	09/26/1977	60
09/27/1976	107	05/27/1977	135	09/27/1977	50
09/28/1976	107	05/28/1977	100	09/28/1977	60
09/29/1976	103	05/29/1977	87	09/29/1977	129
09/30/1976	111	05/30/1977	74	09/30/1977	111
		05/31/1977	62		

Sep-76		May-77		Sep-77	
Max	125	Max	148	Max	129
Min	32	Min	51	Min	9
Mean	73	Mean	85	Mean	31

	Sep-76		May-77		Sep-77
Max	125	Max	148	Max	129
Min	32	Min	51	Min	9
Mean	72.7	Mean	85.5	Mean	30.9

05/01/1978	193
05/02/1978	170
05/03/1978	159
05/04/1978	156
05/05/1978	146
05/06/1978	122
05/07/1978	122
05/08/1978	129
05/09/1978	113
05/10/1978	110
05/11/1978	115
05/12/1978	106
05/13/1978	100
05/14/1978	93
05/15/1978	113
05/16/1978	118
05/17/1978	127
05/18/1978	127
05/19/1978	127
05/20/1978	127
05/21/1978	125
05/22/1978	125
05/23/1978	129
05/24/1978	128
05/25/1978	181
05/26/1978	203
05/27/1978	180
05/28/1978	137
05/29/1978	123
05/30/1978	111
05/31/1978	101
May-78	
Max	203
Min	93
Mean	133

09/01/1978	80
09/02/1978	94
09/03/1978	100
09/04/1978	105
09/05/1978	166
09/06/1978	342
09/07/1978	453
09/08/1978	303
09/09/1978	246
09/10/1978	243
09/11/1978	249
09/12/1978	219
09/13/1978	206
09/14/1978	202
09/15/1978	192
09/16/1978	181
09/17/1978	179
09/18/1978	176
09/19/1978	172
09/20/1978	170
09/21/1978	168
09/22/1978	163
09/23/1978	160
09/24/1978	159
09/25/1978	151
09/26/1978	138
09/27/1978	106
09/28/1978	115
09/29/1978	120
09/30/1978	111
Sep-78	
Max	453
Min	80
Mean	182

05/01/1979	225
05/02/1979	210
05/03/1979	156
05/04/1979	130
05/05/1979	151
05/06/1979	282
05/07/1979	282
05/08/1979	267
05/09/1979	252
05/10/1979	249
05/11/1979	225
05/12/1979	191
05/13/1979	157
05/14/1979	126
05/15/1979	117
05/16/1979	108
05/17/1979	95
05/18/1979	73
05/19/1979	62
05/20/1979	61
05/21/1979	60
05/22/1979	59
05/23/1979	63
05/24/1979	86
05/25/1979	80
05/26/1979	69
05/27/1979	67
05/28/1979	62
05/29/1979	64
05/30/1979	56
05/31/1979	54
May-79	
Max	282
Min	54
Mean	134

	May-78
Max	203
Min	93
Mean	132.8

	Sep-78
Max	453
Min	80
Mean	182.3

	May-79
Max	282
Min	54
Mean	133.5

09/01/1979	92	05/01/1994	58	09/01/1994	16
09/02/1979	87	05/02/1994	53	09/02/1994	18
09/03/1979	95	05/03/1994	42	09/03/1994	20
09/04/1979	95	05/04/1994	51	09/04/1994	27
09/05/1979	85	05/05/1994	76	09/05/1994	26
09/06/1979	66	05/06/1994	154	09/06/1994	20
09/07/1979	55	05/07/1994	194	09/07/1994	14
09/08/1979	57	05/08/1994	175	09/08/1994	17
09/09/1979	60	05/09/1994	128	09/09/1994	19
09/10/1979	51	05/10/1994	92	09/10/1994	14
09/11/1979	49	05/11/1994	81	09/11/1994	13
09/12/1979	52	05/12/1994	69	09/12/1994	26
09/13/1979	61	05/13/1994	69	09/13/1994	26
09/14/1979	62	05/14/1994	55	09/14/1994	28
09/15/1979	61	05/15/1994	47	09/15/1994	31
09/16/1979	63	05/16/1994	56	09/16/1994	27
09/17/1979	59	05/17/1994	59	09/17/1994	30
09/18/1979	56	05/18/1994	54	09/18/1994	28
09/19/1979	59	05/19/1994	52	09/19/1994	29
09/20/1979	66	05/20/1994	74	09/20/1994	31
09/21/1979	60	05/21/1994	86	09/21/1994	31
09/22/1979	61	05/22/1994	99	09/22/1994	35
09/23/1979	58	05/23/1994	89	09/23/1994	32
09/24/1979	53	05/24/1994	88	09/24/1994	46
09/25/1979	66	05/25/1994	88	09/25/1994	43
09/26/1979	75	05/26/1994	52	09/26/1994	35
09/27/1979	87	05/27/1994	57	09/27/1994	45
09/28/1979	90	05/28/1994	58	09/28/1994	53
09/29/1979	118	05/29/1994	59	09/29/1994	66
09/30/1979	119	05/30/1994	56	09/30/1994	54
		05/31/1994	55		

Sep-79		May-94		Sep-94	
Max	119	Max	194	Max	66
Min	49	Min	42	Min	13
Mean	71	Mean	78	Mean	30

	Sep-79		May-94		Sep-94
Max	119	Max	194	Max	66
Min	49	Min	42	Min	13
Mean	70.6	Mean	78.2	Mean	30.0

05/01/1995	355	09/01/1995	61	05/01/1996	144
05/02/1995	369	09/02/1995	56	05/02/1996	148
05/03/1995	369	09/03/1995	55	05/03/1996	149
05/04/1995	371	09/04/1995	48	05/04/1996	153
05/05/1995	373	09/05/1995	47	05/05/1996	163
05/06/1995	397	09/06/1995	54	05/06/1996	157
05/07/1995	445	09/07/1995	56	05/07/1996	156
05/08/1995	403	09/08/1995	65	05/08/1996	149
05/09/1995	339	09/09/1995	64	05/09/1996	139
05/10/1995	333	09/10/1995	59	05/10/1996	140
05/11/1995	279	09/11/1995	58	05/11/1996	117
05/12/1995	266	09/12/1995	52	05/12/1996	101
05/13/1995	265	09/13/1995	56	05/13/1996	91
05/14/1995	257	09/14/1995	61	05/14/1996	94
05/15/1995	241	09/15/1995	69	05/15/1996	118
05/16/1995	209	09/16/1995	70	05/16/1996	121
05/17/1995	184	09/17/1995	67	05/17/1996	158
05/18/1995	194	09/18/1995	62	05/18/1996	269
05/19/1995	203	09/19/1995	52	05/19/1996	273
05/20/1995	202	09/20/1995	51	05/20/1996	215
05/21/1995	206	09/21/1995	56	05/21/1996	206
05/22/1995	251	09/22/1995	59	05/22/1996	275
05/23/1995	230	09/23/1995	62	05/23/1996	221
05/24/1995	209	09/24/1995	61	05/24/1996	211
05/25/1995	213	09/25/1995	80	05/25/1996	201
05/26/1995	211	09/26/1995	79	05/26/1996	161
05/27/1995	180	09/27/1995	78	05/27/1996	198
05/28/1995	157	09/28/1995	77	05/28/1996	200
05/29/1995	137	09/29/1995	85	05/29/1996	171
05/30/1995	130	09/30/1995	87	05/30/1996	151
05/31/1995	115			05/31/1996	149

	May-95		Sep-95		May-96
Max	445	Max	87	Max	275
Min	115	Min	47	Min	91
Mean	261	Mean	63	Mean	168

	May-95		Sep-95		May-96
Max	445	Max	87	Max	275
Min	115	Min	47	Min	91
Mean	261.1	Mean	62.9	Mean	167.8

09/01/1996	43	05/01/1997	164	09/01/1997	91
09/02/1996	41	05/02/1997	171	09/02/1997	92
09/03/1996	46	05/03/1997	162	09/03/1997	96
09/04/1996	44	05/04/1997	155	09/04/1997	86
09/05/1996	50	05/05/1997	156	09/05/1997	58
09/06/1996	40	05/06/1997	146	09/06/1997	58
09/07/1996	44	05/07/1997	145	09/07/1997	50
09/08/1996	47	05/08/1997	133	09/08/1997	42
09/09/1996	41	05/09/1997	112	09/09/1997	44
09/10/1996	39	05/10/1997	102	09/10/1997	43
09/11/1996	42	05/11/1997	111	09/11/1997	64
09/12/1996	57	05/12/1997	107	09/12/1997	64
09/13/1996	63	05/13/1997	114	09/13/1997	60
09/14/1996	75	05/14/1997	171	09/14/1997	75
09/15/1996	92	05/15/1997	146	09/15/1997	140
09/16/1996	84	05/16/1997	78	09/16/1997	134
09/17/1996	82	05/17/1997	72	09/17/1997	110
09/18/1996	96	05/18/1997	71	09/18/1997	123
09/19/1996	103	05/19/1997	67	09/19/1997	129
09/20/1996	107	05/20/1997	63	09/20/1997	118
09/21/1996	108	05/21/1997	58	09/21/1997	94
09/22/1996	103	05/22/1997	52	09/22/1997	72
09/23/1996	115	05/23/1997	64	09/23/1997	74
09/24/1996	117	05/24/1997	71	09/24/1997	82
09/25/1996	116	05/25/1997	80	09/25/1997	92
09/26/1996	109	05/26/1997	90	09/26/1997	103
09/27/1996	107	05/27/1997	86	09/27/1997	96
09/28/1996	108	05/28/1997	88	09/28/1997	93
09/29/1996	107	05/29/1997	74	09/29/1997	100
09/30/1996	115	05/30/1997	63	09/30/1997	108
		05/31/1997	70		

	Sep-96		May-97		Sep-97
Max	117	Max	171	Max	140
Min	39	Min	52	Min	42
Mean	78	Mean	105	Mean	86

	Sep-96		May-97		Sep-97
Max	117	Max	171	Max	140
Min	39	Min	52	Min	42
Mean	78.0	Mean	104.6	Mean	86.4

05/01/1998	255	09/01/1998	69	05/01/1999	247
05/02/1998	293	09/02/1998	68	05/02/1999	251
05/03/1998	536	09/03/1998	67	05/03/1999	270
05/04/1998	683	09/04/1998	67	05/04/1999	285
05/05/1998	895	09/05/1998	75	05/05/1999	235
05/06/1998	824	09/06/1998	73	05/06/1999	231
05/07/1998	549	09/07/1998	57	05/07/1999	231
05/08/1998	470	09/08/1998	62	05/08/1999	242
05/09/1998	770	09/09/1998	101	05/09/1999	236
05/10/1998	1050	09/10/1998	95	05/10/1999	225
05/11/1998	891	09/11/1998	93	05/11/1999	208
05/12/1998	779	09/12/1998	97	05/12/1999	206
05/13/1998	614	09/13/1998	95	05/13/1999	203
05/14/1998	419	09/14/1998	99	05/14/1999	200
05/15/1998	371	09/15/1998	94	05/15/1999	205
05/16/1998	374	09/16/1998	93	05/16/1999	200
05/17/1998	493	09/17/1998	99	05/17/1999	195
05/18/1998	507	09/18/1998	94	05/18/1999	208
05/19/1998	432	09/19/1998	103	05/19/1999	196
05/20/1998	633	09/20/1998	105	05/20/1999	220
05/21/1998	1090	09/21/1998	120	05/21/1999	227
05/22/1998	917	09/22/1998	111	05/22/1999	236
05/23/1998	741	09/23/1998	109	05/23/1999	237
05/24/1998	664	09/24/1998	121	05/24/1999	225
05/25/1998	676	09/25/1998	134	05/25/1999	214
05/26/1998	723	09/26/1998	134	05/26/1999	223
05/27/1998	749	09/27/1998	137	05/27/1999	232
05/28/1998	758	09/28/1998	152	05/28/1999	234
05/29/1998	857	09/29/1998	153	05/29/1999	236
05/30/1998	1080	09/30/1998	143	05/30/1999	250
05/31/1998	911			05/31/1999	236
May-98		Sep-98		May-99	
Max	1090	Max	153	Max	285
Min	255	Min	57	Min	195
Mean	678	Mean	101	Mean	227

	May-98		Sep-98		May-99
Max	1090	Max	153	Max	285
Min	255	Min	57	Min	195
Mean	677.5	Mean	100.7	Mean	227.1

09/01/1999	71	05/01/2000	155	09/01/2000	36
09/02/1999	79	05/02/2000	165	09/02/2000	40
09/03/1999	67	05/03/2000	183	09/03/2000	48
09/04/1999	63	05/04/2000	175	09/04/2000	47
09/05/1999	62	05/05/2000	164	09/05/2000	58
09/06/1999	63	05/06/2000	157	09/06/2000	64
09/07/1999	65	05/07/2000	163	09/07/2000	60
09/08/1999	66	05/08/2000	173	09/08/2000	48
09/09/1999	68	05/09/2000	174	09/09/2000	34
09/10/1999	76	05/10/2000	154	09/10/2000	34
09/11/1999	96	05/11/2000	144	09/11/2000	47
09/12/1999	91	05/12/2000	151	09/12/2000	50
09/13/1999	79	05/13/2000	155	09/13/2000	48
09/14/1999	67	05/14/2000	155	09/14/2000	42
09/15/1999	72	05/15/2000	155	09/15/2000	42
09/16/1999	69	05/16/2000	184	09/16/2000	58
09/17/1999	76	05/17/2000	175	09/17/2000	53
09/18/1999	79	05/18/2000	170	09/18/2000	64
09/19/1999	79	05/19/2000	162	09/19/2000	76
09/20/1999	75	05/20/2000	130	09/20/2000	77
09/21/1999	72	05/21/2000	128	09/21/2000	102
09/22/1999	75	05/22/2000	130	09/22/2000	90
09/23/1999	77	05/23/2000	132	09/23/2000	89
09/24/1999	77	05/24/2000	138	09/24/2000	85
09/25/1999	89	05/25/2000	131	09/25/2000	92
09/26/1999	89	05/26/2000	134	09/26/2000	88
09/27/1999	97	05/27/2000	116	09/27/2000	89
09/28/1999	110	05/28/2000	113	09/28/2000	89
09/29/1999	113	05/29/2000	113	09/29/2000	96
09/30/1999	114	05/30/2000	125	09/30/2000	96
		05/31/2000	126		

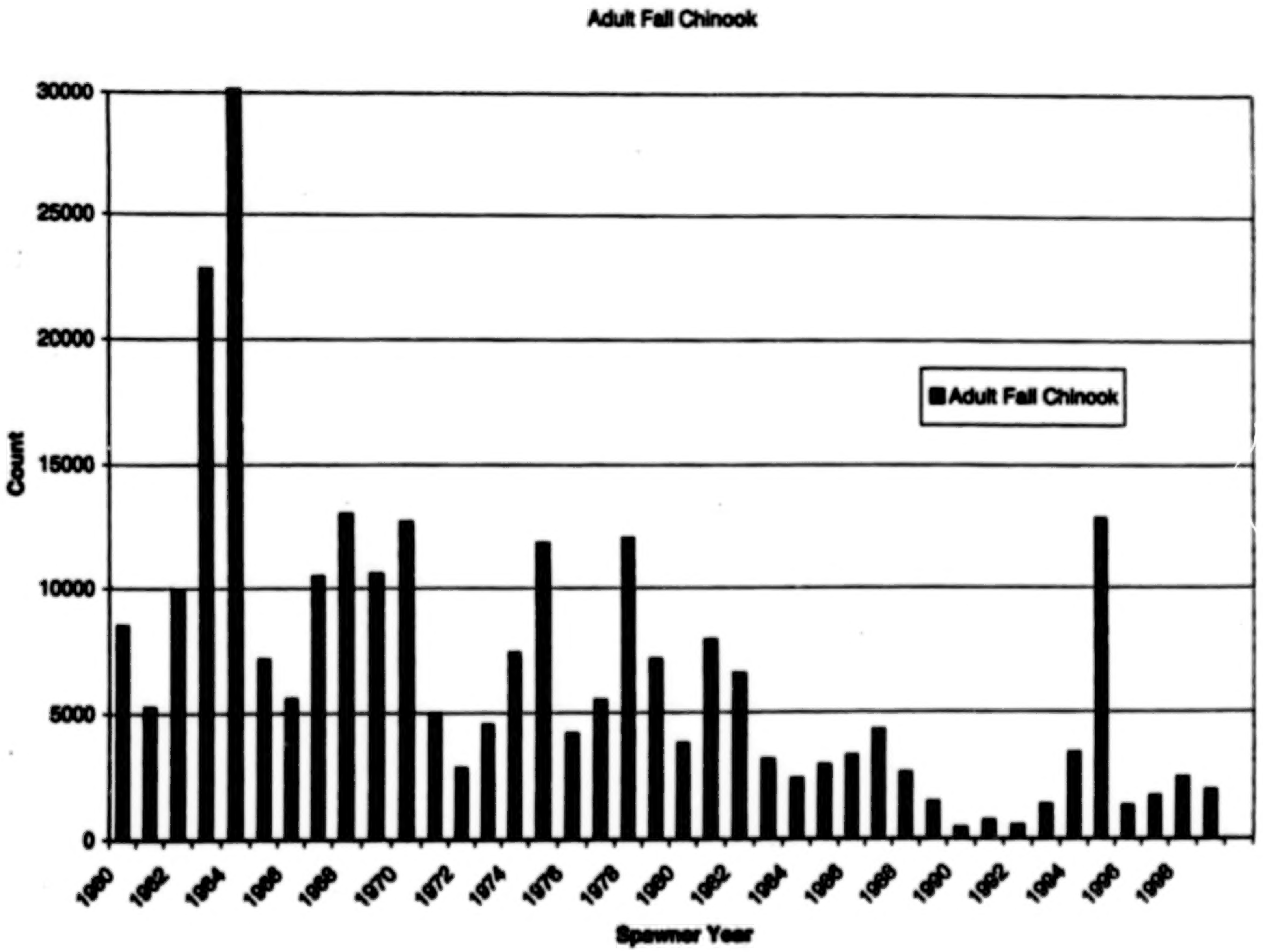
	Sep-99		May-00		Sep-00
Max	114	Max	184	Max	102
Min	62	Min	113	Min	34
Mean	79	Mean	149	Mean	65

	Sep-99		May-00		Sep-00
Max	114	Max	184	Max	102
Min	62	Min	113	Min	34
Mean	79.2	Mean	149.4	Mean	64.7

Attachment 6

Fall Chinook Salmon Returns to Shasta River
1960-1999

Year	Adults	-Year old	Total
1960	8495	995	9490
1961	5250	3514	8764
1962	9907	4991	14898
1963	22824	9013	31837
1964	30175	3648	34363
1965	7136	775	7911
1966	5573	451	6024
1967	10478	1836	12314
1968	13039	1003	14042
1969	10576	3049	13625
1970	12693	712	13405
1971	4970	1646	6619
1972	2802	839	3614
1973	4516	4902	9418
1974	7376	2729	10105
1975	11821	4211	16032
1976	4154	1919	6073
1977	5478	1969	7447
1978	12024	6707	18371
1979	7111	1040	8151
1980	3762	4334	8096
1981	7890	4330	12220
1982	6533	1922	8455
1983	3119	753	3872
1984	2362	480	2842
1985	2897	2227	5124
1986	3274	683	3957
1987	4299	398	4697
1988	2586	256	2842
1989	1440	137	1577
1990	415	118	533
1991	716	10	726
1992	520	66	586
1993	1341	85	1426
1994	3363	1840	5203
1995	12816	695	13511
1996	1305	145	1450
1997	1677	334	2011
1998	2404	138	2542
1999	1895	1292	3187


Adult Fall Chinook
30000
25000
20000
15000
10000
5000
0
Count
Adult Fall Chinook
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
Spawner Year

END

04-5-02